Appalachian Technical Services,Inc.

A SEMI-ANNUAL AQUATIC MONITORING REPORT FOR A SURFACE MINE PERMIT (DMLR # 1101760) LOCATED NEAR ROARING FORK IN WISE COUNTY, VIRGINIA

Prepared for:
Red River Coal Company, Inc

Authored by:

Chris Isaac

ATS PROJECT NO. 1199.01

July 2013

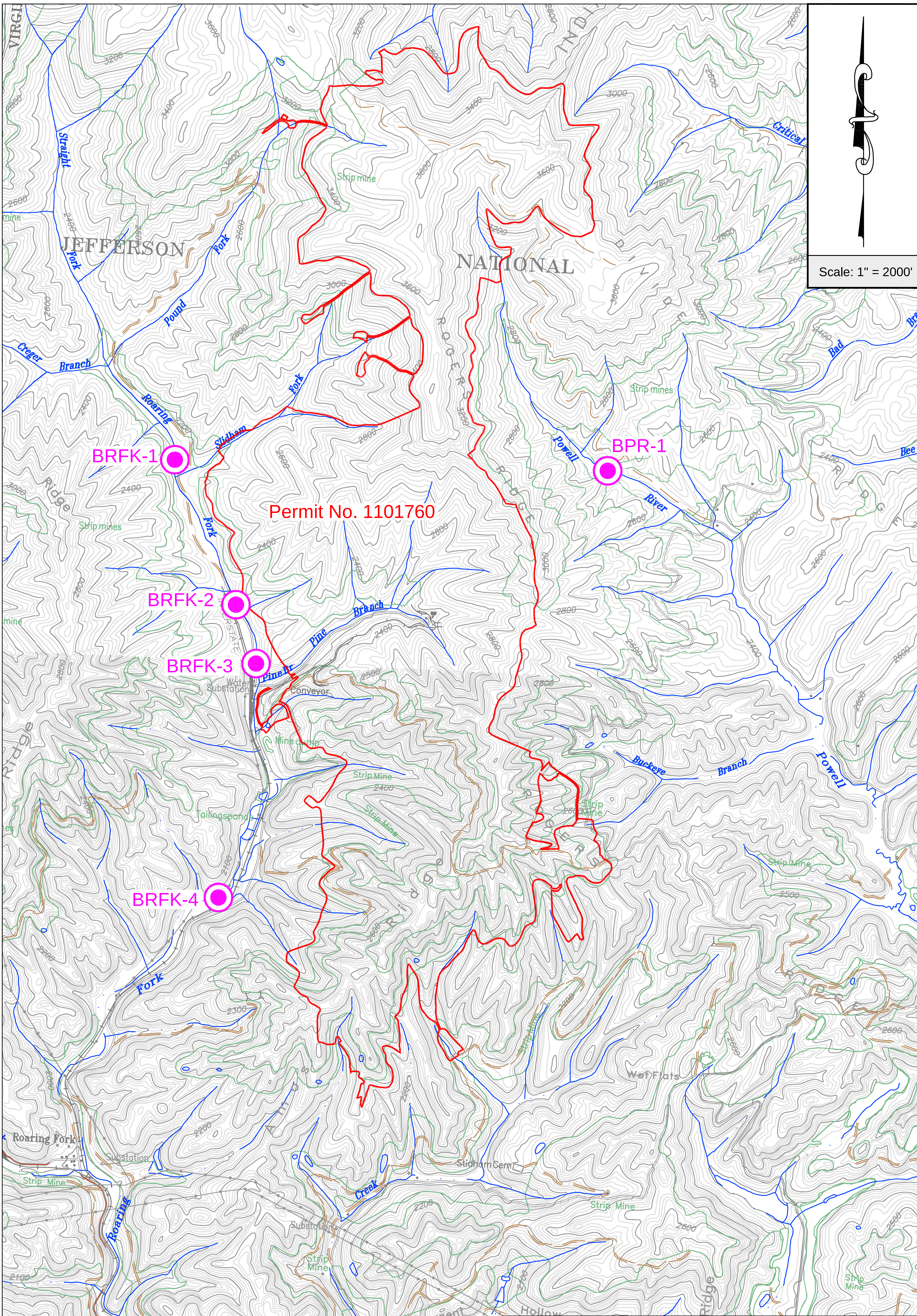
I. INTRODUCTION

Appalachian Technical Services, Inc. was contracted by Red River Coal Company, Inc to conduct ongoing semi-annual (spring and spring) aquatic monitoring at six sites near Roaring Fork in Wise County, Virginia. This report represents the spring 2013 aquatic biological assessments of six sample sites. The permit boundary and sample site locations are shown on the attached topographical map in Figure 1.

II. METHODS

General locations of all sample sites were selected by a Virginia DMLR biologist. However, the exact site locations may have been relocated by ATS senior biologists due to site conditions (*i.e.* low flow, lack of riffle habitat, etc.) and accessibility. Aquatic sampling site BRFK-1 was located on Roaring Fork approximately 50 m upstream of the confluence with Stidham Fork (37.01197; 82.72942). Aquatic sampling site BRFK-2 was located on Roaring Fork approximately 400 m upstream of sample site BFRK-3 (37.00593; 82.72570). Aquatic sampling site BRFK-3 was located on Roaring Fork approximately 50 m upstream of the confluence to Pine Branch (37.99998; 82.72245). Aquatic sampling site BRFK-4 was located southeast of the permit on Roaring Fork approximately 450 m downstream of a series of sediment ponds (39.98559; 82.72422). Aquatic sampling site BCPT-1 was southeast of the permit and located on Canepatch Creek approximately 100 m downstream of the confluence to Sargent Hollow (36.95642; 82.71047). Aquatic sampling site BPR-1 was located to the east of the permit boundary in the upper headwaters of the Powell River approximately 50 m upstream of Red River Coal Company's haulroad (37.01273; 82.69593).

Data collections for the aquatic monitoring consisting of habitat data, macroinvertebrates, grab samples and physiochemical water quality data were collected on 14 and 16 May 2013 by ATS Biological Technicians James Breeding and Joseph Day.


Scale: 1" = 2000'
Permit No. 1101760
BRFK-1
BRFK-2
BRFK-3
BRFK-4
BPR-1
BCPT-1
JEFFERSON
NATIONAL
ROGERS RIDGE
DIVIDE
Straight Fork
Pound Fork
Creger Branch
Roaring Fork
Slidham Fork
Pine Branch
Pine Br
Powell River
Critical
Bad Branch
Bee
Buckeye Branch
Powell
Creek
Canepatch
Strip mine
Strip mines
Strip Mine
Mine dump
Tailingsponds
Conveyor
Water
Substation
Wet Flats
Stidham Cem
Roaring Fork
Deadman Curve
Sargent
Hollow
Ridge

Red River Coal Company, Inc.
Permit No. 1101760

Figure 1: Location Map
Permit and Aquatic Site Locations

Designed By	Drawn By	Checked By	Date
CLI	CLI	TNL	02/2011

ATS® Appalachian Technical Services, Inc. OFFICE-STAT

Quadrangle	Coordinate System
WHITESBURG–NORTON APPALACHIA–FLAT GAP	VA NAD 83

Drawing Number	Sheet
1199.01–Y–AS	1 / 1

Project Number	Scale
1199.01	1"=2000'

A. Habitat Assessments

Rapid Bioassessment Protocol (RBP) high gradient data sheets were used to assess the habitat for each stream. The RBP sheets score each site's habitat based on 10 criteria with 1 - 20 possible points each (for a max total of 200). Based on the *2008 Methods for Assessing Biological Integrity of Surface Waters in Kentucky*, *Revision 3* (KDOW 2008), stream habitat in the central Appalachians Ecoregion is considered not supporting its designated use if the total score is less than or equal to 116 total points. Habitat must score 117 – 159 to achieve a partially supporting criterion. To qualify as fully supporting habitat, it must score at least 160 total points. Copies of the stream habitat data sheets are attached in Appendix A.

B. Aquatic Macroinvertebrates

Macroinvertebrates were collected using the single habitat approach as described in sections 7.1.1 and 7.3.1 of the *Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates and Fish, Second Edition* (Barbour *et al.* 1999).

Macroinvertebrates were collected by agitating a riffle area of 0.25 meters in front of a standard size (500 Φm mesh) kicknet. This process was repeated eight times to achieve 2 square meters of sample area. Upon collection, samples from each site were placed in individual containers of 95% ethyl alcohol, labeled, and returned to the lab.

Subsampling procedures followed methods within Appalachian Technical Services, Inc.'s Virginia Department of Environmental Quality approved *Quality Assurance Project Plan for Biological Monitoring, 2010* and resulted in the identification of approximately 110 (±10%) individuals. All macroinvertebrates were identified by a North American Benthological Society certified taxonomist to family level with the exception of Chironomidae and Oligochaeta.

Macroinvertebrate metrics were calculated based on the methods included in *A*

Stream Condition Index for Virginia Non-Coastal Streams (Tetra Tech, Inc. 2003). ATS biologists used the Ecological Data Application System (EDAS) to statistically rarify the samples to 110 organisms and calculate VSCI scores. The VSCI is used to compare streams to reference conditions to evaluate a streams current health. A stream must score a 61 or above to qualify as acceptable water quality. In order to calculate the VSCI the following metrics were calculated from the family level aquatic macroinvertebrate data: Taxa richness; Ephemeroptera, Plecoptera, Trichoptera (EPT) Index; Percent Ephemeroptera; Percent Plecoptera + Trichoptera (less Hydropsychidae); Percent Scrapers; Percent Chironomidae; Percent of top two dominant families; and Family Biotic Index (FBI). Tables with the macroinvertebrate data are attached in Appendix B.

C. Physiochemical Water Data

Prior to any field data collections, all handheld meters were calibrated. Four water quality parameters (specific conductance, dissolved oxygen, pH, and temperature) were analyzed using a handheld meter (YSI Pro Plus). Upon return to the lab all meters received a post-calibration check to ensure validity of all measurements recorded.

In addition to handheld meters, a surface water grab sample was collected at each sample site and delivered to Environmental Monitoring Inc. for analysis. Parameters analyzed were Acidity, Alkalinity (Bicarbonate), Alkalinity (Carbonate), Total Alkalinity, Hardness, Total Iron, Total Manganese, Nitrate, Nitrite, Total Cyanide, Total Dissolved Solids, Total Phenols, Total Suspended Solids, Total Boron, Total Magnesium, Total Aluminum, Total Antimony, Total Arsenic, Total Barium, Total Beryllium, Total Cadmium, Total Chromium, Total Cobalt, Total Copper, Total Lead, Total Nickel, Total Selenium, Total Silver, Total Thallium, Total Zinc, Total Mercury, Chloride, Sulfate, and Dissolved Organic Carbon. Grab sample analysis data can be found in Appendix C.

III. RESULTS

A. Habitat Assessments

The stream habitat at BRFK-1 scored 141 of 200 (Appendix A), indicating the habitat is partially supporting its designated use. The stream was approximately 15 feet wide and characterized mostly by a series of riffles and runs (Figures 2 and 3). Flow occupied >75% of the stream channel. Embeddedness was suboptimal with approximately 25 to 50% of the substrate particles surrounded by fine sediment. The water was clear but there was slight deposition of sediment within the streambed. The stream banks were moderately stable and with good riparian zones.

The stream habitat at BRFK-2 scored 129 of 200 (Appendix A), indicating the habitat is partially supporting its designated use. The stream was approximately 15 feet wide and characterized mostly by a series of riffles and runs (Figures 4 and 5). Flow occupied >75% of the stream channel. Embeddedness was suboptimal with 25 to 50% of the substrate particles surrounded by fine sediment. The water was clear but there was slight to moderate deposition of sediment within the streambed. The stream banks were moderately stable but the right bank had a narrow riparian zone.

The stream habitat at BRFK-3 scored 130 of 200 (Appendix A), indicating the habitat is partially supporting its designated use. The stream was approximately 15 feet wide and characterized mostly by a series of riffles and runs (Figures 6 and 7). Flow occupied >75% of the stream channel. Embeddedness was suboptimal with 25 to 50% of the substrate particles surrounded by fine sediment. The coloration of the water was clear and there was slight to moderate deposition of sediment within the streambed. The stream banks were moderately stable but the right bank had a narrow riparian zone.

The stream habitat at BRFK-4 scored 137 of 200 (Appendix A), indicating the habitat is partially supporting its designated use. The stream was approximately 15 feet wide and characterized mostly by a series of riffles and runs (Figures 8 and 9). Flow

occupied >75% of the stream channel. Embeddedness was suboptimal with approximately 25 to 50% of the substrate particles surrounded by fine sediment. The coloration of the water was clear but there was evidence of slight to moderate sedimentation within the streambed. Both stream banks were stable and good with riparian zones.

The stream habitat at BCPT-1 scored 125 of 200 (Appendix A), indicating the habitat is partially supporting its designated use. The stream was approximately 12 feet wide and characterized mostly by a series of riffles and runs (Figures 10 and 11). Flow occupied >75% of the stream channel. Embeddedness was suboptimal with 25 to 50% of the substrate particles surrounded by fine sediment. The coloration of the water was clear but there was evidence of moderate sedimentation within the streambed. The stream banks were somewhat stable but the right bank had a narrow riparian zone.

The stream habitat at BPR-1 scored 133 of 200 (Appendix A), indicating the habitat is partially supporting its designated use. The stream was approximately 6 feet wide and characterized mostly by a series of mostly riffles (Figures 12 and 13). Flow occupied >75% of the stream channel. Embeddedness was suboptimal with approximately 25 to 50% of the substrate particles surrounded by fine sediment. The coloration of the water was clear but there was evidence of moderate deposition of sediment within the streambed. The stream banks were stable and with good riparian areas.

B. Macroinvertebrates

Sample site BPR-1 had the highest Taxa and highest EPT Richness (Tables 1 and 2). Sample site BPR-1 had the lowest FBI score (2.5) indicating excellent water quality with organic pollution unlikely (Table 2). VSCI scores for the six aquatic sample sites ranged from a low of 23.61 (BRFK-1) to a high of 55.16 (BPR-1) (Table 2).

C. Physiochemical Water Data

All handheld meters passed post-calibration tests except for the specific conductance records at sample sites BRFK-1, BRFK-3 and BRFK-4. Specific conductances for the six sites ranged from 823 µS (BPR-1) to 1319 µS (BRFK-2) (Table 3). All other parameters recorded were within normal limits. The results of the water chemistry grab samples for each site are attached in Appendix C.

IV. CONCLUSION

Based on RBP habitat data, all six sample sites appear to be somewhat impaired. Habitat assessments revealed that the habitat was marginal to suboptimal at all six sample sites. Five of the six sample sites had a VSCI score below the unimpaired threshold of 61. Only sample site BPR1 had a VSCI score above the unimpairment threshold of 61. All the sample sites had low; Taxa Richness, EPT Richness, percent Ephemeroptera, percent PT-Hydropsychidae, percent scrapers, and high percent two dominants. All water parameters recorded with a handheld meter were within normal limits with an exception of elevated specific conductances.

Figure 2: BRFK-1 upstream view

Figure 3: BRFK-1 downstream view

Figure 4: BRFK-2 upstream view

Figure 5: BRFK-2 downstream view

Figure 6: BRFK-3 upstream view

Figure 7: BRFK-3 downstream view

Figure 8: BRFK-4 upstream view

Figure 9: BRFK-4 downstream view

Figure 10: BCPT-1 upstream view

Figure 11: BCPT-1 downstream view

Figure 12: BPR-1 upstream view

Figure 13: BPR-1 downstream view

Literature Cited

Barbour, M. T., J. Gerritsen, B. D. Snyder, and J. B. Stribling. 1999. Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates and Fish, Second Edition. EPA 841-B-99-002. U.S. Environmental Protection Agency; Office of Water; Washington, D.C.

Kentucky Division of Water (KDOW), 2008. Methods for assessing biological integrity of surface waters in Kentucky, Revision 3. Kentucky Department of Environmental Protection, Division of Water, Frankfort, Kentucky.

Tetra Tech, Inc. 2003. A Stream Condition Index for Virginia Non-Coastal Streams. Tetra Tech, Inc. Owings Mills, Maryland. Prepared for Virginia Department of Environmental Quality, Richmond, Virginia.

APPENDIX A:

RBP DATA

Benthic Macroinvertebrate Field Data Sheet (front)

Station ID: 1199.01-BRFK1 Ecoregion: _____ Land Use: _____

Field Team: JEB, JDD Survey Reason: Bio. Monitoring Start Time: 11:10

Stream Name: Roaring Fork Location: Adjacent to pond location Finish Time: 11:40

Date: 5/16/13 Latitude: 37.01197 Longitude: 82.72942

Stream Physicochemical

Instrument ID number: YSI-PRO pH: 8.01

Temperature: 14.7 Co Conductivity: 59.7 uS/cm

Dissolved Oxygen: 12.88 mg/l Did instrument pass all post-calibration checks? Y / N

If NO - which parameter(s) failed and action _____

Benthic Macroinvertebrate Collection

Method used (circle one) Single Habitat (Riffle) Multi Habitat (Logs, plants, etc)

Riffle Quality (circle one) Good Marginal Poor None

Habitats sampled (circle one) Riffle Snags Banks Vegetation

Jabs _____ _____ _____ _____

Area Sampled (sq. m.): 2m²

Weather Observations

Current Weather (circle one) Cloudy Clear Rain/Snow Foggy

Recent precipitation (circle one) Clear Showers Rain Storms Other _____

Stream flow (circle one) Low Normal Above Normal Flood

INSTREAM WATERSHED FEATURES:

Stream Width 15 ft

Range of Depth 2.0 ft

Average Velocity _____ ft/s

Discharge _____ cfs

Est. Reach Length 100m

LOCAL WATERSHED FEATURES:

Predominant Surrounding Land Use:

θ Surface Mining θ Construction θ Forest

θ Deep Mining θ Commercial θ Pasture/Grazing

θ Oil Wells θ Industrial θ Silviculture

θ Land Disposal θ Row Crops θ Urban Runoff/Storm Sewers

Hydraulic Structures:

θ Dams θ Bridge Abutments

θ Island θ Waterfalls

θ Other _____

Stream Flow:

θ Dry θ Pooled θ Low θ Normal

θ High θ Very Rapid or Torrential

Stream Type:

θ Perennial θ Intermittent

θ Ephemeral θ Seep

Riparian Vegetation:

Dominate Type:

θ Trees θ Shrubs

θ Grasses θ Herbaceous

Number of strata 3

Dom. Tree/Shrub Taxa

Hemlock

Rododendron

Buckeye

Canopy Cover:

θ Fully Shaded (75-100%)

θ Partially Shaded (50-75%)

θ Partially Exposed (25-50%)

θ Fully Exposed (0-25%)

Channel Alterations:

θ Dredging

θ Channelization

(θ Full θ Partial)

Substrate θ Est. θ P.C. Riffle 70 % Run 25 % Pool 5 %

HighGradient Habitat Data Sheet

1. Epifaunal Substrate/Available Cover

Optimal: Greater then 70% of substrate favorable for epifauna colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e. logs/snags that are not new fall and not transient).

Suboptimal: 40-70% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).

Marginal: 20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.

Poor: Less than 20% stable habitat, lack of habitat is obvious; substrate unstable or lacking.

SCORE 20 19 18 17 16 **15** 14 13 12 11 10 9 8 7 6 5 4 3 2 1

2. Embeddedness

Optimal: Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.

Suboptimal: Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.

Marginal: Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.

Poor: Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.

SCORE 20 19 18 17 16 15 14 13 12 **11** 10 9 8 7 6 5 4 3 2 1

3. Velocity/Depth Regime

Optimal: Cover All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). Slow is <0.3 m/s, deep is >0.5

Suboptimal: Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).

Marginal: Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).

Poor: Dominated by 1 velocity/depth regime (usually slow-deep).

SCORE 20 19 18 17 16 15 14 13 12 **11** 10 9 8 7 6 5 4 3 2 1

1199.01-BRFK1

	Optimal	Suboptimal	Marginal	Poor
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment. 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent.
SCORE	20 19 18 17 16	15 14 13 (12) 11	10 9 8 7 6	5 4 3 2 1

m/s.

	Optimal	Suboptimal	Marginal	Poor
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or 25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1

	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal patter.	Some channelization present, usually in areas of bridge abutements; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 - 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 (14) 13 12 11	10 9 8 7 6	5 4 3 2 1

	Optimal	Suboptimal	Marginal	Poor
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance btw. riffled divided by width of the stream <7:1 (generally 5 to 7); variety of habitats is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance btw. riffles divided by the width of the stream is btw. 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance btw. riffles divided by the width of the stream is btw. 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance btw. riffles divided by the width of the stream is a ration of >25%.
SCORE	20 19 18 17 16	15 (14) 13 12 11	10 9 8 7 6	5 4 3 2 1

	Optimal	Suboptimal	Marginal	Poor
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. < 5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable, 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas "raw" areas
SCORE RB	10 9	(8) 7 6	5 4 3	2 1 0
SCORE LB	10 9	(8) 7 6	5 4 3	2 1 0

	Optimal	Suboptimal	Marginal	Poor
9. Vegetative Protection (score each bank)	More than 90% of the stream bank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or non-woody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of stream bank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the stream bank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less then one-half of the potential plant stubble height remaining.	Less than 50% of the stream bank surfaces covered by vegetation; disruption of stream bank vegetation is very high; vegetation has been removed to 5 cm or less in average stubble height.
SCORE RB	10 9	(8) 7 6	5 4 3	2 1 0
SCORE LB	10 9	(8) 7 6	5 4 3	2 1 0

	Optimal	Suboptimal	Marginal	Poor
10. Riparian Vegetative Zone Width (score each bank)	Width of riparian zone >18 m; human activities (i.e. parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 m; human activites have impacted zone only minimally.	Width of riparian zone 6-12 m; human activiteid have impacted zone a great deal.	Width if riparian zone <6 m; little or no riparian vegetation due to human activities.
SCORE RB	10 (9)	(8) 7 6	5 4 3	2 1 0
SCORE LB	10 (9)	(8) 7 6	5 4 3	2 1 0

SCORE 141

Benthic Macroinvertebrate Field Data Sheet (front)

Station ID: 199.01-BRFK2 Ecoregion: _____ Land Use: _____

Field Team: JEB, SDD Survey Reason: Bio. Monitoring Start Time: 10:30

Stream Name: Roaring Fork Location: Adjacent to haul road Finish Time: 10:55

Date: 5/16/13 Latitude: 37.00593 Longitude: 82.72570

Stream Physicochemical

Instrument ID number: YSI-PRO pH: 8.27

Temperature: 15.5 Co Conductivity: 1319 uS/cm

Dissolved Oxygen: 12.72 mg/l Did instrument pass all post-calibration checks? Y/N

If NO - which parameter(s) failed and action _____

Benthic Macroinvertebrate Collection

Method used (circle one) Single Habitat (Riffle) Multi Habitat (Logs, plants, etc)

Riffle Quality (circle one) Good Marginal Poor None

Habitats sampled (circle one) Riffle Snags Banks Vegetation Area Sampled (sq.m.): 2m²

Jabs _____ _____ _____ _____

Weather Observations

Current Weather (circle one) Cloudy Clear Rain/Snow Foggy

Recent precipitation (circle one) Clear Showers Rain Storms Other _____

Stream flow (circle one) Low Normal Above Normal Flood

INSTREAM WATERSHED FEATURES:

Stream Width 15 ft

Range of Depth 2.0 ft

Average Velocity _____ ft/s

Discharge _____ cfs

Est. Reach Length 100m

LOCAL WATERSHED FEATURES:

Predominant Surrounding Land Use:

θ Surface Mining θ Construction θ Forest

θ Deep Mining θ Commercial θ Pasture/Grazing

θ Oil Wells θ Industrial θ Silviculture

θ Land Disposal θ Row Crops θ Urban Runoff/Storm Sewers

Hydraulic Structures:

θ Dams θ Bridge Abutments

θ Island θ Waterfalls

θ Other _____

Stream Flow:

θ Dry θ Pooled θ Low θ Normal

θ High θ Very Rapid or Torrential

Stream Type:

θ Perennial θ Intermittent

θ Ephemeral θ Seep

Riparian Vegetation:

Dominate Type:

θ Trees θ Shrubs

θ Grasses θ Herbaceous

Number of strata ____

Dom. Tree/Shrub Taxa

Ironwood

Poplar

Autumolive

Canopy Cover:

θ Fully Shaded (75-100%)

θ Partially Shaded (50-75%)

θ Partially Exposed (25-50%)

θ Fully Exposed (0-25%)

Channel Alterations:

θ Dredging

θ Channelization

(θ Full θ Partial)

Substrate θ Est. θ P.C. Riffle 70 % Run 30 % Pool 0 %

HighGradient Habitat Data Sheet

	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/Available Cover	Greater then 70% of substrate favorable for epifauna colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e. logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat, lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 (14) 13 12 11	10 9 8 7 6	5 4 3 2 1
2. Embeddedness	Optimal: Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Suboptimal: Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Marginal: Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Poor: Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE	20 19 18 17 16	15 14 13 (12) 11	10 9 8 7 6	5 4 3 2 1
3. Velocity/Depth Regime	Optimal: Cover All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). Slow is <0.3 m/s, deep is >0.5	Suboptimal: Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Marginal: Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Poor: Dominated by 1 velocity/depth regime (usually slow-deep).
SCORE	20 19 18 17 16	15 14 13 12 (11)	10 9 8 7 6	5 4 3 2 1

1199.01-BRFK2

	Optimal	Suboptimal	Marginal	Poor
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment. 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1

m/s.

	Optimal	Suboptimal	Marginal	Poor
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or 25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1

	Optimal	Suboptimal	Marginal	Poor
6. Channelization	Channelization or dredging absent or minimal; stream with normal patter.	Some channelization present, usually in areas of bridge abutements; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 - 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1

	Optimal	Suboptimal	Marginal	Poor
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance btw. riffled divided by width of the stream <7:1 (generally 5 to 7); variety of habitats is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance btw. riffles divided by the width of the stream is btw. 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance btw. riffles divided by the width of the stream is btw. 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance btw. riffles divided by the width of the stream is a ration of >25%.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1

	Optimal	Suboptimal	Marginal	Poor
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. < 5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable, 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas "raw" areas
SCORE RB	10 9	8 7 6	5 4 3	2 1 0
SCORE LB	10 9	8 7 6	5 4 3	2 1 0

	Optimal	Suboptimal	Marginal	Poor
9. Vegetative Protection (score each bank)	More than 90% of the stream bank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or non-woody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of stream bank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the stream bank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less then one-half of the potential plant stubble height remaining.	Less than 50% of the stream bank surfaces covered by vegetation; disruption of stream bank vegetation is very high; vegetation has been removed to 5 cm or less in average stubble height.
SCORE RB	10 9	8 7 6	5 4 3	2 1 0
SCORE LB	10 9	8 7 6	5 4 3	2 1 0

	Optimal	Suboptimal	Marginal	Poor
10. Riparian Vegetative Zone Width (score each bank)	Width of riparian zone >18 m; human activities (i.e. parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 m; human activites have impacted zone only minimally.	Width of riparian zone 6-12 m; human activiteid have impacted zone a great deal.	Width if riparian zone <6 m; little or no riparian vegetation due to human activites.
SCORE RB	10 9	8 7 6	5 4 3	2 1 0
SCORE LB	10 9	8 7 6	5 4 3	2 1 0

SCORE 129

Benthic Macroinvertebrate Field Data Sheet (front)

Station ID: 1199.01-BBFK3 Ecoregion: _____ Land Use: _____

Field Team: JBB, JDD Survey Reason: Bio. Monitoring Start Time: 10:00

Stream Name: Roaring Fork Location: Adjacent to old coke ovens Finish Time: 10:20

Date: 5/16/13 Latitude: 36.99998 Longitude: 82.72245

Stream Physicochemical

Instrument ID number: YSI-PRO pH: 8.32

Temperature: 15.2 Ca Conductivity: 55.2 uS/cm

Dissolved Oxygen: 12.63 mg/l Did instrument pass all post-calibration checks? Y / N

If NO – which parameter(s) failed and action _____

Benthic Macroinvertebrate Collection

Method used (circle one) Single Habitat (Riffle) Multi Habitat (Logs, plants, etc)

Riffle Quality (circle one) Good Marginal Poor None

Habitats sampled (circle one) Riffle Snags Banks Vegetation Area Sampled (sq. m.): 2m²

Jabs _____ _____ _____ _____

Weather Observations

Current Weather (circle one) Cloudy Clear Rain/Snow Foggy

Recent precipitation (circle one) Clear Showers Rain Storms Other _____

Stream flow (circle one) Low Normal Above Normal Flood

INSTREAM WATERSHED FEATURES:

Stream Width 15 ft

Range of Depth 1.0 ft

Average Velocity _____ ft/s

Discharge _____ cfs

Est. Reach Length 100m

LOCAL WATERSHED FEATURES:

Predominant Surrounding Land Use:

- θ Surface Mining
- θ Deep Mining
- θ Oil Wells
- θ Land Disposal
- θ Construction
- θ Commercial
- θ Industrial
- θ Row Crops
- θ Forest
- θ Pasture/Grazing
- θ Silviculture
- θ Urban Runoff/Storm Sewers

Hydraulic Structures:

θ Dams θ Bridge Abutments θ Island θ Waterfalls θ Other

Stream Flow:

θ Dry θ Pooled θ Low θ Normal θ High θ Very Rapid or Torrential

Stream Type:

θ Perennial θ Intermittent θ Ephemeral θ Seep

Riparian Vegetation:

Dominate Type: θ Trees θ Shrubs θ Grasses θ Herbaceous

Number of strata 3

Dom. Tree/Shrub Taxa: Sycamore, Beech, Rododendron

Canopy Cover:

θ Fully Shaded (75-100%)
θ Partially Shaded (50-75%)
X Partially Exposed (25-50%)
θ Fully Exposed (0-25%)

Channel Alterations:

θ Dredging
θ Channelization
(θ Full θ Partial)

Substrate θ Est. θ P.C. Riffle 70 % Run 30 % Pool 0 %

HighGradient Habitat Data Sheet

	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/Available Cover	Greater then 70% of substrate favorable for epifauna colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e. logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat, lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 (14) 13 12 11	10 9 8 7 6	5 4 3 2 1
2. Embeddedness	Optimal: Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Suboptimal: Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Marginal: Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Poor: Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE	20 19 18 17 16	15 14 (13) 12 11	10 9 8 7 6	5 4 3 2 1
3. Velocity/Depth Regime	Optimal: Cover All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). Slow is <0.3 m/s, deep is >0.5	Suboptimal: Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Marginal: Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Poor: Dominated by 1 velocity/depth regime (usually slow-deep).
SCORE	20 19 18 17 16	15 14 13 12 11	(10) 9 8 7 6	5 4 3 2 1

1199.01- BRFK3

	Optimal	Suboptimal	Marginal	Poor
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment. 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent.
SCORE	20 19 18 17 16	15 14 13 12 (11)	10 9 8 7 6	5 4 3 2 1
	m/s.			
	Optimal	Suboptimal	Marginal	Poor
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or 25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	(15) 14 13 12 11	10 9 8 7 6	5 4 3 2 1
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal patter.	Some channelization present, usually in areas of bridge abutements; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 - 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 (11)	10 9 8 7 6	5 4 3 2 1
	Optimal	Suboptimal	Marginal	Poor
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance btw. riffled divided by width of the stream <7:1 (generally 5 to 7); variety of habitats if key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance btw. riffles divided by the width of the stream is btw. 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance btw. riffles divided by the width of the stream is btw. 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance btw. riffles divided by the width of the stream is a ration of >25%.
SCORE	20 19 18 17 16	15 (14) 13 12 11	10 9 8 7 6	5 4 3 2 1
	Optimal	Suboptimal	Marginal	Poor
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. < 5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable, 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas "raw" areas
SCORE RB	10 9	(8) 7 6	5 4 3	2 1 0
SCORE LB	10 9	(8) 7 6	5 4 3	2 1 0
	Optimal	Suboptimal	Marginal	Poor
9. Vegetative Protection (score each bank)	More than 90% of the stream bank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or non-woody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of stream bank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the stream bank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less then one-half of the potential plant stubble height remaining.	Less than 50% of the stream bank surfaces covered by vegetation; disruption of stream bank vegetation is very high; vegetation has been removed to 5 cm or less in average stubble height.
SCORE RB	10 9	8 7 (6)	5 4 3	2 1 0
SCORE LB	10 9	(8) 7 6	5 4 3	2 1 0
	Optimal	Suboptimal	Marginal	Poor
10. Riparian Vegetative Zone Width (score each bank)	Width of riparian zone >18 m; human activities (i.e, parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 m; human activites have impacted zone only minimally.	Width of riparian zone 6-12 m; human activiteid have impacted zone a great deal.	Width if riparian zone <6 m; little or no riparian vegetation due to human activities.
SCORE RB	10 9	8 7 6	5 4 (3)	2 1 0
SCORE LB	10 (9)	8 7 6	5 4 3	2 1 0

SCORE 130

Benthic Macroinvertebrate Field Data Sheet (front)

Station ID: 1199.01-BRFK4 | Ecoregion: | Land Use:
Field Team: JEB, JDD | Survey Reason: Bio. Monitoring | Start Time: 9:15
Stream Name: Roaring Fork | Location: 50m down stream of unnamed tributary | Finish Time: 9:45
Date: 5/14/15 | Latitude: 36.98559 | Longitude: 82.72442

Stream Physicochemical

Instrument ID number: YSI-PRO
Temperature: 14.7 Ca
Dissolved Oxygen: 12.95 mg/l
pH: 8.29
Conductivity: 54.9 uS/cm
Did instrument pass all post-calibration checks? Y / N
If NO – which parameter(s) failed and action

Benthic Macroinvertebrate Collection

Method used (circle one): Single Habitat (Riffle) Multi Habitat (Logs, plants, etc)
Riffle Quality (circle one): Good Marginal Poor None
Habitats sampled (circle one): Riffle Snags Banks Vegetation
Jabs
Area Sampled (sq. m.): 2m²

Weather Observations

Current Weather (circle one): Cloudy Clear Rain/Snow Foggy
Recent precipitation (circle one): Clear Showers Rain Storms Other
Stream flow (circle one): Low Normal Above Normal Flood

INSTREAM WATERSHED FEATURES:
Stream Width 15 ft
Range of Depth 2.0 ft
Average Velocity ft/s
Discharge cfs
Est. Reach Length 100m

LOCAL WATERSHED FEATURES:
Predominant Surrounding Land Use:

θ Surface Mining	θ Construction	θ Forest
θ Deep Mining	θ Commercial	θ Pasture/Grazing
θ Oil Wells	θ Industrial	θ Silviculture
θ Land Disposal	θ Row Crops	θ Urban Runoff/Storm Sewers

Hydraulic Structures:
θ Dams θ Bridge Abutments
θ Island θ Waterfalls
θ Other

Stream Flow:
θ Dry θ Pooled θ Low θ Normal
θ High θ Very Rapid or Torrential

Stream Type:
θ Perennial θ Intermittent
θ Ephemeral θ Seep

Riparian Vegetation:
Dominate Type:
θ Trees θ Shrubs
θ Grasses θ Herbaceous
Number of strata 3

Dom. Tree/Shrub Taxa
Sycamore
Poplar
Autumnolive

Canopy Cover:
θ Fully Shaded (75-100%)
θ Partially Shaded (50-75%)
θ Partially Exposed (25-50%)
θ Fully Exposed (0-25%)

Channel Alterations:
θ Dredging
θ Channelization
(θ Full θ Partial)

Substrate θ Est. θ P.C. Riffle 60 % Run 35 % Pool 5 %

HighGradient Habitat Data Sheet

1. Epifaunal Substrate/Available Cover

Optimal: Greater then 70% of substrate favorable for epifauna colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e. logs/snags that are not new fall and not transient).

Suboptimal: 40-70% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).

Marginal: 20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.

Poor: Less than 20% stable habitat, lack of habitat is obvious; substrate unstable or lacking.

SCORE 20 19 18 17 16 | 15 14 13 12 11 | 10 9 8 7 6 | 5 4 3 2 1

2. Embeddedness

Optimal: Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.

Suboptimal: Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.

Marginal: Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.

Poor: Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.

SCORE 20 19 18 17 16 | 15 14 13 12 11 | 10 9 8 7 6 | 5 4 3 2 1

3. Velocity/Depth Regime

Optimal: Cover All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). Slow is <0.3 m/s, deep is >0.5

Suboptimal: Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).

Marginal: Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).

Poor: Dominated by 1 velocity/depth regime (usually slow-deep).

SCORE 20 19 18 17 16 | 15 14 13 12 11 | 10 9 8 7 6 | 5 4 3 2 1

1199.01- BRFK4

	Optimal	Suboptimal	Marginal	Poor
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment. 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent.
SCORE	20 19 18 17 16	15 14 13 12 (11)	10 9 8 7 6	5 4 3 2 1
	m/s.			
	Optimal	Suboptimal	Marginal	Poor
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or 25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	(15) 14 13 12 11	10 9 8 7 6	5 4 3 2 1
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal patter.	Some channelization present, usually in areas of bridge abutements; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 - 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	(15) 14 13 12 11	10 9 8 7 6	5 4 3 2 1
	Optimal	Suboptimal	Marginal	Poor
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance btw. riffled divided by width of the stream <7:1 (generally 5 to 7); variety of habitats is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance btw. riffles divided by the width of the stream is btw. 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance btw. riffles divided by the width of the stream is btw. 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance btw. riffles divided by the width of the stream is a ration of >25%.
SCORE	20 19 18 17 16	15 14 13 (12) 11	10 9 8 7 6	5 4 3 2 1
	Optimal	Suboptimal	Marginal	Poor
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. < 5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable, 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas "raw" areas
SCORE RB	10 9	(8) 7 6	5 4 3	2 1 0
SCORE LB	10 9	(8) 7 6	5 4 3	2 1 0
	Optimal	Suboptimal	Marginal	Poor
9. Vegetative Protection (score each bank)	More than 90% of the stream bank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or non-woody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of stream bank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the stream bank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less then one-half of the potential plant stubble height remaining.	Less than 50% of the stream bank surfaces covered by vegetation; disruption of stream bank vegetation is very high; vegetation has been removed to 5 cm or less in average stubble height.
SCORE RB	10 9	(8) 7 6	5 4 3	2 1 0
SCORE LB	10 9	(8) 7 6	5 4 3	2 1 0
	Optimal	Suboptimal	Marginal	Poor
10. Riparian Vegetative Zone Width (score each bank)	Width of riparian zone >18 m; human activities (i.e. parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 m; human activites have impacted zone only minimally.	Width of riparian zone 6-12 m; human activiteid have impacted zone a great deal.	Poor Width if riparian zone <6 m; little or no riparian vegetation due to human activities.
SCORE RB	10 (9)	8 7 6	5 4 3	2 1 0
SCORE LB	10 9	8 7 (6)	5 4 3	2 1 0

SCORE 137

Benthic Macroinvertebrate Field Data Sheet (front)

Station ID: 1199.01 - BCPT1 Ecoregion: _____ Land Use: _____

Field Team: JEB, JDH Survey Reason: Bio. Monitoring Start Time: 8:25

Stream Name: Canepatch Creek Location: 100m down stream of Unnamed tributary Finish Time: 9:55

Date: 5/14/13 Latitude: 36.95642 Longitude: 82.71047

Stream Physicochemical

Instrument ID number: YSI-PRO pH: 8.05

Temperature: 16.1 Ca Conductivity: 855 uS/cm

Dissolved Oxygen: 12.16 mg/l Did instrument pass all post-calibration checks? Y / N

If NO - which parameter(s) failed and action _____

Benthic Macroinvertebrate Collection

Method used (circle one) Single Habitat (Riffle) Multi Habitat (Logs, plants, etc)

Riffle Quality (circle one) Good Marginal Poor None

Habitats sampled (circle one) Riffle Snags Banks Vegetation Area Sampled (sq. m.): 2m²

Jabs _____ _____ _____ _____

Weather Observations

Current Weather (circle one) Cloudy Clear Rain/Snow Foggy

Recent precipitation (circle one) Clear Showers Rain Storms Other _____

Stream flow (circle one) Low Normal Above Normal Flood

INSTREAM WATERSHED FEATURES:

Stream Width 12 ft

Range of Depth 1.5 ft

Average Velocity _____ ft/s

Discharge _____ cfs

Est. Reach Length 100m

LOCAL WATERSHED FEATURES:

Predominant Surrounding Land Use:

- θ Surface Mining
- θ Deep Mining
- θ Oil Wells
- θ Land Disposal
- θ Construction
- θ Commercial
- θ Industrial
- θ Row Crops
- θ Forest
- θ Pasture/Grazing
- θ Silviculture
- θ Urban Runoff/Storm Sewers

Hydraulic Structures:

θ Dams θ Bridge Abutments

θ Island θ Waterfalls

θ Other _____

Stream Flow:

θ Dry θ Pooled θ Low θ Normal

θ High θ Very Rapid or Torrential

Stream Type:

θ Perennial θ Intermittent

θ Ephemeral θ Seep

Riparian Vegetation:

Dominate Type:

θ Trees θ Shrubs

θ Grasses θ Herbaceous

Number of strata 3

Dom. Tree/Shrub Taxa

Hemlock

Buckeye

Rododendron

Canopy Cover:

θ Fully Shaded (75-100%)

θ Partially Shaded (50-75%)

θ Partially Exposed (25-50%)

θ Fully Exposed (0-25%)

Channel Alterations:

θ Dredging

θ Channelization

(θ Full θ Partial)

Substrate θ Est. θ P.C. Riffle 60 % Run 40 % Pool 0 %

HighGradient Habitat Data Sheet

1. Epifaunal Substrate/Available Cover

Optimal: Greater then 70% of substrate favorable for epifauna colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e. logs/snags that are not new fall and not transient).

Suboptimal: 40-70% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).

Marginal: 20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.

Poor: Less than 20% stable habitat, lack of habitat is obvious; substrate unstable or lacking.

SCORE 20 19 18 17 16 | 15 14 (13) 12 11 | 10 9 8 7 6 | 5 4 3 2 1

2. Embeddedness

Optimal: Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.

Suboptimal: Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.

Marginal: Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.

Poor: Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.

SCORE 20 19 18 17 16 | 15 14 13 12 (11) | 10 9 8 7 6 | 5 4 3 2 1

3. Velocity/Depth Regime

Optimal: Cover All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). Slow is <0.3 m/s, deep is >0.5

Suboptimal: Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).

Marginal: Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).

Poor: Dominated by 1 velocity/depth regime (usually slow-deep).

SCORE 20 19 18 17 16 | 15 14 13 12 (11) | 10 9 8 7 6 | 5 4 3 2 1

1199.01 - BCPT 1

	Optimal	Suboptimal	Marginal	Poor
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment. 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent.
SCORE	20 19 18 17 16	15 14 13 12 11	10 (9) 8 7 6	5 4 3 2 1

m/s.

	Optimal	Suboptimal	Marginal	Poor
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or 25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	(15) 14 13 12 11	10 9 8 7 6	5 4 3 2 1

	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal patter.	Some channelization present, usually in areas of bridge abutements; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 - 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 (14) (13) 12 11	10 9 8 7 6	5 4 3 2 1

	Optimal	Suboptimal	Marginal	Poor
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance btw. riffled divided by width of the stream <7:1 (generally 5 to 7); variety of habitats if key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance btw. riffles divided by the width of the stream is btw. 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance btw. riffles divided by the width of the stream is btw. 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance btw. riffles divided by the width of the stream is a ration of >25%.
SCORE	20 19 18 17 16	15 14 13 12 (11)	10 9 8 7 6	5 4 3 2 1

	Optimal	Suboptimal	Marginal	Poor
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. < 5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable, 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas "raw" areas
SCORE RB	10 9	8 7 6	(5) 4 3	2 1 0
SCORE LB	10 9	8 (7) 6	5 4 3	2 1 0

	Optimal	Suboptimal	Marginal	Poor
9. Vegetative Protection (score each bank)	More than 90% of the stream bank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or non-woody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of stream bank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the stream bank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less then one-half of the potential plant stubble height remaining.	Less than 50% of the stream bank surfaces covered by vegetation; disruption of stream bank vegetation is very high; vegetation has been removed to 5 cm or less in average stubble height.
SCORE RB	10 9	(8) 7 6	5 4 3	2 1 0
SCORE LB	10 9	(8) 7 6	5 4 3	2 1 0

	Optimal	Suboptimal	Marginal	Poor
10. Riparian Vegetative Zone Width (score each bank)	Width of riparian zone >18 m; human activities (i.e. parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 m; human activites have impacted zone only minimally.	Width of riparian zone 6-12 m; human activiteid have impacted zone a great deal.	Width if riparian zone <6 m; little or no riparian vegetation due to human activities.
SCORE RB	10 9	8 7 6	5 (4) 3	2 1 0
SCORE LB	10 (9)	8 7 6	5 4 3	2 1 0

SCORE 125

Benthic Macroinvertebrate Field Data Sheet (front)

Station ID: 1199.01-BPR1 Ecoregion: _____ Land Use: _____

Field Team: JEB, JDD Survey Reason: Bio. Monitoring Start Time: 12:15

Stream Name: Powell River Location: 50m upstream of road crossing Finish Time: 12:40

Date: 5/16/13 Latitude: 37.01273 Longitude: 82.69593

Stream Physicochemical

Instrument ID number: YSI-PRO pH: 8.09

Temperature: 13.7 Co Conductivity: 823 uS/cm

Dissolved Oxygen: 12.98 mg/l Did instrument pass all post-calibration checks? Y / N

If NO – which parameter(s) failed and action _____

Benthic Macroinvertebrate Collection

Method used (circle one) Single Habitat (Riffle) Multi Habitat (Logs, plants, etc)

Riffle Quality (circle one) Good Marginal Poor None

Habitats sampled (circle one) Riffle Snags Banks Vegetation Area Sampled (sq. m.): 2m²

Jabs _____ _____ _____ _____

Weather Observations

Current Weather (circle one) Cloudy Clear Rain/Snow Foggy

Recent precipitation (circle one) Clear Showers Rain Storms Other _____

Stream flow (circle one) Low Normal Above Normal Flood

INSTREAM WATERSHED FEATURES:

Stream Width 6.0 ft

Range of Depth 0.5 ft

Average Velocity _____ ft/s

Discharge _____ cfs

Est. Reach Length 100m

LOCAL WATERSHED FEATURES:

Predominant Surrounding Land Use:

θ Surface Mining θ Construction θ Forest

θ Deep Mining θ Commercial θ Pasture/Grazing

θ Oil Wells θ Industrial θ Silviculture

θ Land Disposal θ Row Crops θ Urban Runoff/Storm Sewers

Hydraulic Structures:

θ Dams θ Bridge Abutments

θ Island θ Waterfalls

θ Other _____

Stream Flow:

θ Dry θ Pooled θ Low θ Normal

θ High θ Very Rapid or Torrential

Stream Type:

θ Perennial θ Intermittent

θ Ephemeral θ Seep

Riparian Vegetation:

Dominate Type:

θ Trees θ Shrubs

θ Grasses θ Herbaceous

Number of strata 2

Dom. Tree/Shrub Taxa

Buckeye

Poplar

Maple

Canopy Cover:

θ Fully Shaded (75-100%)

θ Partially Shaded (50-75%)

θ Partially Exposed (25-50%)

θ Fully Exposed (0-25%)

Channel Alterations:

θ Dredging

θ Channelization

(θ Full θ Partial)

Substrate θ Est. θ P.C. Riffle 20 % Run 20 % Pool 0 %

HighGradient Habitat Data Sheet

	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/Available Cover	Greater then 70% of substrate favorable for epifauna colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e. logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colinzation (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat, lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 (12) 11	10 9 8 7 6	5 4 3 2 1
2. Embeddedness	Optimal Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Suboptimal Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Marginal Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Poor Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE	20 19 18 17 16	15 14 (13) 12 11	10 9 8 7 6	5 4 3 2 1
3. Velocity/Depth Regime	Optimal CoverAll four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). Slow is <0.3 m/s, deep is >0.5	Suboptimal Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Marginal Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Poor Dominated by 1 velocity/depth regime (usually slow-deep).
SCORE	20 19 18 17 16	15 14 13 12 11	(10) 9 8 7 6	5 4 3 2 1

1199.01-BRI

4. Sediment Deposition	Optimal Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Suboptimal Some new increase in bar formation, mostly from gravel, sand or fine sediment. 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Marginal Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of	Poor Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent.
SCORE	20 19 18 17 16	15 14 13 12 11	(10) 9 8 7 6	5 4 3 2 1
	m/s.			
5. Channel Flow Status	Optimal Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Suboptimal Water fills >75% of the available channel; or 25% of channel substrate is exposed.	Marginal Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Poor Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	(15) 14 13 12 11	10 9 8 7 6	5 4 3 2 1
6. Channel Alteration	Optimal Channelization or dredging absent or minimal; stream with normal patter.	Suboptimal Some channelization present, usually in areas of bridge abutements; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Marginal Channelization may be extensive; embankments or shoring structures present on both banks; and 40 - 80% of stream reach channelized and disrupted.	Poor Banks shored with gabion or cement over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	(15) 14 13 12 11	10 9 8 7 6	5 4 3 2 1
7. Frequency of Riffles (or bends)	Optimal Occurrence of riffles relatively frequent; ratio of distance btw. riffled divided by width of the stream <7:1 (generally 5 to 7); variety of habitats if key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Suboptimal Occurrence of riffles infrequent; distance btw. riffles divided by the width of the stream is btw. 7 to 15.	Marginal Occasional riffle or bend; bottom contours provide some habitat; distance btw. riffles divided by the width of the stream is btw. 15 to 25.	Poor Generally all flat water or shallow riffles; poor habitat; distance btw. riffles divided by the width of the stream is ration of >25%.
SCORE	20 19 18 17 16	15 14 13 (12) 11	10 9 8 7 6	5 4 3 2 1
8. Bank Stability (score each bank)	Optimal Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. < 5% of bank affected.	Suboptimal Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Marginal Moderately unstable, 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Poor Unstable; many eroded areas "raw" areas
SCORE RB	10 9	8 7 (6)	5 4 3	2 1 0
SCORE LB	10 9	8 7 (6)	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	Optimal More than 90% of the stream bank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or non-woody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	Suboptimal 70-90% of stream bank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	Marginal 50-70% of the stream bank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less then one-half of the potential plant stubble height remaining.	Poor Less than 50% of the stream bank surfaces covered by vegetation; disruption of stream bank vegetation is very high; vegetation has been removed to 5 cm or less in average stubble height.
SCORE RB	10 9	(8) 7 6	5 4 3	2 1 0
SCORE LB	10 9	(8) 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank)	Optimal Width of riparian zone >18 m; human activities (i.e, parking lots, roadbaeds, clear-cuts, lawns, or crops) have not impacted zone.	Suboptimal Width of riparian zone 12-18 m; human activites have impacted zone only minimally.	Marginal Width of riparian zone 6-12 m; human activiteld have impacted zone a great deal.	Poor Width if riparian zone <6 m; little or no riparian vegetation due to human activities.
SCORE RB	10 (9)	8 7 6	5 4 3	2 1 0
SCORE LB	10 (9)	8 7 6	5 4 3	2 1 0

SCORE 133

APPENDIX B:

TABLES

Table 1. Quantitative listings of macroinvertebrates collected 14 and 16 May 2013 from six aquatic sample sites for surface mine permit number 1101760 in Wise County, Virginia.

Order	Family	Spring 2013					
		BRFK-1	BRFK-2	BRFK-3	BRFK-4	BCPT-1	BPR-1
Ephemeroptera	Baetidae		1	1	28	17	6
Plecoptera	Leuctridae				1	25	49
	Nemouridae	20		4	5	14	12
	Peltoperlidae						1
	Perlidae						1
	Perlodidae					7	6
Trichoptera	Hydropsychidae	62	52	57	38	16	18
	Hydroptilidae		1				
	Philopotamidae					1	
	Polycentropodidae				1		
Coleoptera	Elmidae					1	16
	Psephenidae						2
Diptera	Ceratopogonidae	1					
	Chironomidae	16	30	34	27	30	3
	Empididae	6	10	1	7	4	6
	Simuliidae		7	2		4	
	Tipulidae	2		1			
Odonata	Gomphidae			1			
Decapoda	Cambaridae	2	1				1
Annelida	Oligochaeta	2	8	8	3		
		111	110	109	110	119	121

Table 2. VSCI metrics calculated from the macroinvertebrates collected 14 and 16 May 2013 at six aquatic sample sites for surface mine permit number 1101760 in Wise County, Virginia

Family Metrics	Spring 2013					
	BRFK-1	BRFK-2	BRFK-3	BRFK-4	BCPT-1	BPR-1
Taxa Richness	8	8	9	8	10	12
EPT Taxa	2	3	3	5	6	7
% Ephemeroptera	0	0.91	0.92	25.45	14.29	4.96
% PT - Hydropsychidae	18	0.9	3.7	6.4	39.5	57
% Scrapers	0	0.91	0	0	0.84	14.88
% Chironomidae	14.41	27.27	31.19	24.55	25.21	2.48
% 2 Dominant	73.87	74.55	83.49	60	46.22	55.37
FBI	5.19	5.97	5.74	5.23	3.65	2.5
VSCI	37.4	29.78	29.41	43.07	58.86	64.64

Table 3. Physiochemical water data collected 14 and 16 May 2013 at six aquatic sample sites for surface mine permit number 1101760 in Wise County, Virginia.

Parameter	BRFK-1	BRFK-2	BRFK-3	BRFK-4	BCPT-1	BPR-1
Temperature (Celsius)	14.7	15.5	15.2	14.7	16.1	13.7
Specific Conductance (µs)	*59.7	1319	*55.2	*54.9	855	823
pH	8.01	8.27	8.32	8.29	8.05	8.09
Dissolved Oxygen mg/l)	12.88	12.72	12.63	12.95	12.16	12.98

* = Meter Malfunction

APPENDIX C:

GRAB SAMPLE ANALYSIS

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P.O. BOX 1190 ▲ NORTON, VIRGINIA 24273 ▲ 276/679-6544

Certificate of Analysis

Client Name: RED RIVER COAL COMPANY
Address: P.O. BOX 668
NORTON, VA 24273

Report Date: 05/30/13
Lab Sample No.: **1325819**
Client No.: 95
EMI Project No.: 97

Sample Identification: 1199.01 - BCPT1

Site Description: 1101760

Date Collected: 05/16/13
Time Collected: 825
Sample Matrix: AQ
Collected By: J BREEDING

Parameter		Sample Result	Units	MDL	RL	Method	Date Analyzed	Time Analyzed	Analyst
Acidity, Hot		BDL	mg/l CaCO3	1.00	1.00	SM 2310B-2011	5/28/2013	1334	MCF
Alkalinity		175	mg/l CaCO3	1.00	1.00	SM 2320B-2011	5/28/2013	927	MCF
Alkalinity, CO3	Not NELAP	1.63	mg/l	0.100		4500-CO2-D	5/29/2013	1142	JLW
Alkalinity, HC03	Not NELAP	173	mg/l	0.100		4500-CO2-D	5/29/2013	1142	JLW
Bromide		0.070 J	mg/l	0.020	0.200	EPA 300.0	5/17/2013	1444	JLW
Chloride		4.74	mg/l	0.011	0.100	EPA 300.0	5/24/2013	1413	KMC
Conductivity		903	umhos/cm	1.00	1.00	SM 2510B-2011	5/17/2013	1955	JRS
Flow, Measured	Not NELAP	2173	gpm				5/16/2013	825	FLD
Hardness, Total		420	mg/l CaCO3	4.00	4.00	SM 2340 C-2011	5/17/2013	1634	SAS
Nitrate		2.44	mg/l	0.012	0.200	EPA 300.0	5/17/2013	1444	JLW
Nitrite		0.090 J	mg/l	0.016	0.200	EPA 300.0	5/17/2013	1444	JLW
pH	Not NELAP	8.05	STD			SM 4500-H+B-201	5/16/2013	825	FLD
Sulfate		288	mg/l	0.206	1.00	EPA 300.0	5/24/2013	1413	KMC
Total Dissolved Solids		678	mg/l	50.0	50.0	SM 2540C-2011	5/17/2013	1336	THR
Total Suspended Solids		3.00	mg/l	2.50	2.50	SM 2540 D-2011	5/16/2013	2307	MLS

To the best of our knowledge and belief, the collection, preservation, and analysis of all parameters represented by this report have been determined to comply the requirements as specified in 40 CFR, Part 136.
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VA Laboratory ID#: 460038
WV Laboratory ID#: 105
EPA Laboratory ID#: VA00010

The release of this report is authorized by:

R. J. Porter
Technical Director

Flow if Avaliable (GPM): 2173.0
Temp. if Available (C): 12.2
Depth if Available (Ft):
Analysis Package Code: EPA0902R

PSCN
Rev-7-24-12

Type of Sample: Grab
BDL = Below Detection Limit
FLD = Field Technician
MR = Multiple analytical runs were used for this result
IV = Flag indicates Insufficient Sample Volume

J = Flag indicates estimated value below Report Limit
T = Results indicate possible toxicity which is expected to influence reported value.
NA = A result for this analyte is not available.
MI = Matrix Interference - Final result may not be representative.
BQ = Batch QC Outside Acceptable Range
HE = Parameter Hold Time Exceeded
FC = Failure to Comply Current SOP
R = Sample results rejected because of gross deficiencies in QC or method performance .

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Certificate of Analysis

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NORTON, VA 24273

Report Date: 05/30/13
Lab Sample No.: **1325819**
Client No.: 95
EMI Project No.: 97

Sample Identification: 1199.01 - BCPT1

Site Description: 1101760

Date Collected: 05/16/13
Time Collected: 825
Sample Matrix: AQ
Collected By: J BREEDING

Parameter	Sample Result	Units	MDL	RL	Method	Date Analyzed	Time Analyzed	Analyst
Aluminum, Total	0.094	mg/l	0.024	0.050	200.7	5/21/2013	6	AWM
Antimony, Total	BDL	ug/l	0.113	2.00	200.8	5/21/2013	1307	CLS
Arsenic, Total	0.350 J	ug/l	0.154	2.00	200.8	5/21/2013	1307	CLS
Barium, Total	78.3	ug/l	0.171	2.00	200.8	5/21/2013	1307	CLS
Beryllium, Total	BDL	ug/l	0.078	2.00	200.8	5/21/2013	1307	CLS
Boron, Total	0.012 J	mg/l	0.0054	0.030	200.7	5/22/2013	1315	AWM
Cadmium, Total	BDL	ug/l	0.154	2.00	200.8	5/21/2013	1307	CLS
Chromium, Total	0.137 J	ug/l	0.098	2.00	200.8	5/21/2013	1307	CLS
Cobalt, Total	0.363 J	ug/l	0.143	2.00	200.8	5/21/2013	1307	CLS
Copper, Total	0.555 J	ug/l	0.080	2.00	200.8	5/21/2013	1307	CLS
Iron, Total	0.415	mg/l	0.016	0.050	200.7	5/21/2013	6	AWM
Lead, Total	0.140 J	ug/l	0.054	2.00	200.8	5/21/2013	1307	CLS
Magnesium, Total	44.9	mg/l	0.032	0.500	EPA 200.7	5/22/2013	936	AWM
Manganese, Total	0.109	mg/l	0.011	0.050	200.7	5/21/2013	6	AWM
Mercury, Total	BDL	ug/l	0.161	0.500	EPA 245.1-REV.3	5/21/2013	1409	SAS
Nickel, Total	0.983 J	ug/l	0.169	2.00	200.8	5/21/2013	1307	CLS
Selenium, Total	5.00	ug/l	0.731	2.00	200.8	5/21/2013	1307	CLS

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Report Date: 05/30/13
Lab Sample No.: **1325819**
Client No.: 95
EMI Project No.: 97

Sample Identification: 1199.01 - BCPT1

Site Description: 1101760

Date Collected: 05/16/13
Time Collected: 825
Sample Matrix: AQ
Collected By: J BREEDING

Parameter	Sample Result	Units	MDL	RL	Method	Date Analyzed	Time Analyzed	Analyst
Silver, Total	BDL	ug/l	0.101	2.00	200.8	5/21/2013	1307	CLS
Thallium, Total	BDL	ug/l	0.076	2.00	200.8	5/21/2013	1307	CLS
Zinc, Total	1.23 J	ug/l	0.328	10.0	200.8	5/21/2013	1307	CLS

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Client Name: RED RIVER COAL COMPANY
Address: P.O. BOX 668
NORTON, VA 24273

Report Date: 06/03/13
Lab Sample No.: **1325820**
Client No.: 95
EMI Project No.: 97

Sample Identification: 1199.01 - BRFK4

Site Description: 1101760

Date Collected: 05/16/13
Time Collected: 915
Sample Matrix: AQ
Collected By: J BREEDING

Parameter		Sample Result	Units	MDL	RL	Method	Date Analyzed	Time Analyzed	Analyst
Acidity, Hot		BDL	mg/l CaCO3	1.00	1.00	SM 2310B-2011	5/28/2013	1335	MCF
Alkalinity		172	mg/l CaCO3	1.00	1.00	SM 2320B-2011	5/28/2013	930	MCF
Alkalinity, CO3	Not NELAP	3.17	mg/l	0.100		4500-CO2-D	5/29/2013	1142	JLW
Alkalinity, HC03	Not NELAP	169	mg/l	0.100		4500-CO2-D	5/29/2013	1142	JLW
Bromide		BDL	mg/l	0.020	0.200	EPA 300.0	5/17/2013	1500	JLW
Chloride		5.19	mg/l	0.011	0.100	EPA 300.0	5/24/2013	1423	KMC
Conductivity		1309	umhos/cm	1.00	1.00	SM 2510B-2011	5/17/2013	1956	JRS
Flow, Measured	Not NELAP	8560	gpm				5/16/2013	915	FLD
Hardness, Total		560	mg/l CaCO3	4.00	4.00	SM 2340 C-2011	5/17/2013	1634	SAS
Nitrate		0.740	mg/l	0.012	0.200	EPA 300.0	5/17/2013	1500	JLW
Nitrite		0.090 J	mg/l	0.016	0.200	EPA 300.0	5/17/2013	1500	JLW
pH	Not NELAP	8.29	STD			SM 4500-H+B-201	5/16/2013	915	FLD
Sulfate		458	mg/l	1.03	5.00	EPA 300.0	5/29/2013	1819	KMC
Total Dissolved Solids		1032	mg/l	50.0	50.0	SM 2540C-2011	5/17/2013	1338	THR
Total Suspended Solids		8.00	mg/l	2.50	2.50	SM 2540 D-2011	5/16/2013	2306	MLS

To the best of our knowledge and belief, the collection, preservation, and analysis of all parameters represented by this report have been determined to comply the requirements as specified in 40 CFR, Part 136.
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VA Laboratory ID#: 460038
WV Laboratory ID#: 105
EPA Laboratory ID#: VA00010

The release of this report is authorized by:

R. J. Porter
Technical Director

Flow if Avaliable (GPM): 8560.0
Temp. if Available (C): 14.7
Depth if Available (Ft):
Analysis Package Code: EPA0902R

PSCN
Rev-7-24-12

Type of Sample: Grab
BDL = Below Detection Limit
FLD = Field Technician
MR = Multiple analytical runs were used for this result
IV = Flag indicates Insufficient Sample Volume

J = Flag indicates estimated value below Report Limit
T = Results indicate possible toxicity which is expected to influence reported value.
NA = A result for this analyte is not available.
MI = Matrix Interference - Final result may not be representative.
BQ = Batch QC Outside Acceptable Range
HE = Parameter Hold Time Exceeded
FC = Failure to Comply Current SOP
R = Sample results rejected because of gross deficiencies in QC or method performance .

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Certificate of Analysis

Client Name: RED RIVER COAL COMPANY
Address: P.O. BOX 668
NORTON, VA 24273

Report Date: 06/03/13
Lab Sample No.: **1325820**
Client No.: 95
EMI Project No.: 97

Sample Identification: 1199.01 - BRFK4

Site Description: 1101760

Date Collected: 05/16/13
Time Collected: 915
Sample Matrix: AQ
Collected By: J BREEDING

Parameter	Sample Result	Units	MDL	RL	Method	Date Analyzed	Time Analyzed	Analyst
Aluminum, Total	0.117	mg/l	0.024	0.050	200.7	5/21/2013	8	AWM
Antimony, Total	0.235 J	ug/l	0.113	2.00	200.8	5/21/2013	1227	CLS
Arsenic, Total	0.261 J	ug/l	0.154	2.00	200.8	5/21/2013	1227	CLS
Barium, Total	35.0	ug/l	0.171	2.00	200.8	5/21/2013	1227	CLS
Beryllium, Total	BDL	ug/l	0.078	2.00	200.8	5/21/2013	1227	CLS
Boron, Total	0.015 J	mg/l	0.0054	0.030	200.7	5/22/2013	1319	AWM
Cadmium, Total	BDL	ug/l	0.154	2.00	200.8	5/21/2013	1227	CLS
Chromium, Total	0.153 J	ug/l	0.098	2.00	200.8	5/21/2013	1227	CLS
Cobalt, Total	0.381 J	ug/l	0.143	2.00	200.8	5/21/2013	1227	CLS
Copper, Total	0.581 J	ug/l	0.080	2.00	200.8	5/21/2013	1227	CLS
Iron, Total	0.351	mg/l	0.016	0.050	200.7	5/21/2013	8	AWM
Lead, Total	0.178 J	ug/l	0.054	2.00	200.8	5/21/2013	1227	CLS
Magnesium, Total	58.4	mg/l	0.032	0.500	EPA 200.7	5/22/2013	941	AWM
Manganese, Total	0.075	mg/l	0.011	0.050	200.7	5/21/2013	8	AWM
Mercury, Total	BDL	ug/l	0.161	0.500	EPA 245.1-REV.3	5/21/2013	1409	SAS
Nickel, Total	1.16 J	ug/l	0.169	2.00	200.8	5/21/2013	1227	CLS
Selenium, Total	3.56	ug/l	0.731	2.00	200.8	5/21/2013	1227	CLS

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Certificate of Analysis

Client Name: RED RIVER COAL COMPANY
Address: P.O. BOX 668
NORTON, VA 24273

Report Date: 06/03/13
Lab Sample No.: **1325820**
Client No.: 95
EMI Project No.: 97

Sample Identification: 1199.01 - BRFK4

Site Description: 1101760

Date Collected: 05/16/13
Time Collected: 915
Sample Matrix: AQ
Collected By: J BREEDING

Parameter	Sample Result	Units	MDL	RL	Method	Date Analyzed	Time Analyzed	Analyst
Silver, Total	BDL	ug/l	0.101	2.00	200.8	5/21/2013	1227	CLS
Thallium, Total	BDL	ug/l	0.076	2.00	200.8	5/21/2013	1227	CLS
Zinc, Total	1.88 J	ug/l	0.328	10.0	200.8	5/21/2013	1227	CLS

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Certificate of Analysis

Client Name: RED RIVER COAL COMPANY
Address: P.O. BOX 668
NORTON, VA 24273

Report Date: 06/03/13
Lab Sample No.: **1325821**
Client No.: 95
EMI Project No.: 97

Sample Identification: 1199.01 - BRFK3

Site Description: 1101760

Date Collected: 05/16/13
Time Collected: 1000
Sample Matrix: AQ
Collected By: J BREEDING

Parameter		Sample Result	Units	MDL	RL	Method	Date Analyzed	Time Analyzed	Analyst
Acidity, Hot		BDL	mg/l CaCO3	1.00	1.00	SM 2310B-2011	5/28/2013	1335	MCF
Alkalinity		202	mg/l CaCO3	1.00	1.00	SM 2320B-2011	5/28/2013	932	MCF
Alkalinity, CO3	Not NELAP	3.71	mg/l	0.100		4500-CO2-D	5/29/2013	1142	JLW
Alkalinity, HC03	Not NELAP	198	mg/l	0.100		4500-CO2-D	5/29/2013	1142	JLW
Bromide		0.070 J	mg/l	0.020	0.200	EPA 300.0	5/17/2013	1516	JLW
Chloride		6.61	mg/l	0.011	0.100	EPA 300.0	5/24/2013	1433	KMC
Conductivity		1384	umhos/cm	1.00	1.00	SM 2510B-2011	5/17/2013	1956	JRS
Flow, Measured	Not NELAP	4574	gpm				5/16/2013	1000	FLD
Hardness, Total		540	mg/l CaCO3	4.00	4.00	SM 2340 C-2011	5/17/2013	1634	SAS
Nitrate		0.500	mg/l	0.012	0.200	EPA 300.0	5/17/2013	1516	JLW
Nitrite		0.090 J	mg/l	0.016	0.200	EPA 300.0	5/17/2013	1516	JLW
pH	Not NELAP	8.32	STD			SM 4500-H+B-201	5/16/2013	1000	FLD
Sulfate		503	mg/l	1.03	5.00	EPA 300.0	5/29/2013	1620	KMC
Total Dissolved Solids		1044	mg/l	50.0	50.0	SM 2540C-2011	5/17/2013	1339	THR
Total Suspended Solids		5.00	mg/l	2.50	2.50	SM 2540 D-2011	5/16/2013	2308	MLS

To the best of our knowledge and belief, the collection, preservation, and analysis of all parameters represented by this report have been determined to comply the requirements as specified in 40 CFR, Part 136.
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VA Laboratory ID#: 460038
WV Laboratory ID#: 105
EPA Laboratory ID#: VA00010

The release of this report is authorized by:

R. J. Porter
Technical Director

Flow if Avaliable (GPM): 4574.0
Temp. if Available (C): 15.2
Depth if Available (Ft):
Analysis Package Code: EPA0902R

PSCN
Rev-7-24-12

Type of Sample: Grab
BDL = Below Detection Limit
FLD = Field Technician
MR = Multiple analytical runs were used for this result
IV = Flag indicates Insufficient Sample Volume

J = Flag indicates estimated value below Report Limit
T = Results indicate possible toxicity which is expected to influence reported value.
NA = A result for this analyte is not available.
MI = Matrix Interference - Final result may not be representative.
BQ = Batch QC Outside Acceptable Range
HE = Parameter Hold Time Exceeded
FC = Failure to Comply Current SOP
R = Sample results rejected because of gross deficiencies in QC or method performance .

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Certificate of Analysis

Client Name: RED RIVER COAL COMPANY
Address: P.O. BOX 668
NORTON, VA 24273

Report Date: 06/03/13
Lab Sample No.: **1325821**
Client No.: 95
EMI Project No.: 97

Sample Identification: 1199.01 - BRFK3

Site Description: 1101760

Date Collected: 05/16/13
Time Collected: 1000
Sample Matrix: AQ
Collected By: J BREEDING

Parameter	Sample Result	Units	MDL	RL	Method	Date Analyzed	Time Analyzed	Analyst
Aluminum, Total	0.113	mg/l	0.024	0.050	200.7	5/21/2013	9	AWM
Antimony, Total	0.122 J	ug/l	0.113	2.00	200.8	5/21/2013	1232	CLS
Arsenic, Total	0.272 J	ug/l	0.154	2.00	200.8	5/21/2013	1232	CLS
Barium, Total	32.9	ug/l	0.171	2.00	200.8	5/21/2013	1232	CLS
Beryllium, Total	BDL	ug/l	0.078	2.00	200.8	5/21/2013	1232	CLS
Boron, Total	0.016 J	mg/l	0.0054	0.030	200.7	5/22/2013	1322	AWM
Cadmium, Total	BDL	ug/l	0.154	2.00	200.8	5/21/2013	1232	CLS
Chromium, Total	0.138 J	ug/l	0.098	2.00	200.8	5/21/2013	1232	CLS
Cobalt, Total	0.302 J	ug/l	0.143	2.00	200.8	5/21/2013	1232	CLS
Copper, Total	0.543 J	ug/l	0.080	2.00	200.8	5/21/2013	1232	CLS
Iron, Total	0.293	mg/l	0.016	0.050	200.7	5/21/2013	9	AWM
Lead, Total	0.173 J	ug/l	0.054	2.00	200.8	5/21/2013	1232	CLS
Magnesium, Total	55.9	mg/l	0.032	0.500	EPA 200.7	5/22/2013	946	AWM
Manganese, Total	0.069	mg/l	0.011	0.050	200.7	5/21/2013	9	AWM
Mercury, Total	BDL	ug/l	0.161	0.500	EPA 245.1-REV.3	5/21/2013	1409	SAS
Nickel, Total	1.05 J	ug/l	0.169	2.00	200.8	5/21/2013	1232	CLS
Selenium, Total	2.68	ug/l	0.731	2.00	200.8	5/21/2013	1232	CLS

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Certificate of Analysis

Client Name: RED RIVER COAL COMPANY
Address: P.O. BOX 668
NORTON, VA 24273

Report Date: 06/03/13
Lab Sample No.: **1325821**
Client No.: 95
EMI Project No.: 97

Sample Identification: 1199.01 - BRFK3
Site Description: 1101760

Date Collected: 05/16/13
Time Collected: 1000
Sample Matrix: AQ
Collected By: J BREEDING

Parameter	Sample Result	Units	MDL	RL	Method	Date Analyzed	Time Analyzed	Analyst
Silver, Total	BDL	ug/l	0.101	2.00	200.8	5/21/2013	1232	CLS
Thallium, Total	BDL	ug/l	0.076	2.00	200.8	5/21/2013	1232	CLS
Zinc, Total	1.54 J	ug/l	0.328	10.0	200.8	5/21/2013	1232	CLS

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Certificate of Analysis

Client Name: RED RIVER COAL COMPANY
Address: P.O. BOX 668
NORTON, VA 24273

Report Date: 06/03/13
Lab Sample No.: **1325822**
Client No.: 95
EMI Project No.: 97

Sample Identification: 1199.01 - BRFK2

Site Description: 1101760

Date Collected: 05/16/13
Time Collected: 1030
Sample Matrix: AQ
Collected By: J BREEDING

Parameter		Sample Result	Units	MDL	RL	Method	Date Analyzed	Time Analyzed	Analyst
Acidity, Hot		BDL	mg/l CaCO3	1.00	1.00	SM 2310B-2011	5/28/2013	1335	MCF
Alkalinity		212	mg/l CaCO3	1.00	1.00	SM 2320B-2011	5/28/2013	935	MCF
Alkalinity, CO3	Not NELAP	3.90	mg/l	0.100		4500-CO2-D	5/29/2013	1142	JLW
Alkalinity, HC03	Not NELAP	208	mg/l	0.100		4500-CO2-D	5/29/2013	1142	JLW
Bromide		0.100 J	mg/l	0.020	0.200	EPA 300.0	5/17/2013	1532	JLW
Chloride		5.19	mg/l	0.011	0.100	EPA 300.0	5/24/2013	1443	KMC
Conductivity		1390	umhos/cm	1.00	1.00	SM 2510B-2011	5/17/2013	1957	JRS
Flow, Measured	Not NELAP	3699	gpm				5/16/2013	1030	FLD
Hardness, Total		524	mg/l CaCO3	4.00	4.00	SM 2340 C-2011	5/17/2013	1634	SAS
Nitrate		0.470	mg/l	0.012	0.200	EPA 300.0	5/17/2013	1532	JLW
Nitrite		0.090 J	mg/l	0.016	0.200	EPA 300.0	5/17/2013	1532	JLW
pH	Not NELAP	8.27	STD			SM 4500-H+B-201	5/16/2013	1030	FLD
Sulfate		443	mg/l	1.03	5.00	EPA 300.0	5/29/2013	1630	KMC
Total Dissolved Solids		1016	mg/l	50.0	50.0	SM 2540C-2011	5/17/2013	1340	THR
Total Suspended Solids		8.00	mg/l	2.50	2.50	SM 2540 D-2011	5/16/2013	2309	MLS

To the best of our knowledge and belief, the collection, preservation, and analysis of all parameters represented by this report have been determined to comply the requirements as specified in 40 CFR, Part 136.
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VA Laboratory ID#: 460038
WV Laboratory ID#: 105
EPA Laboratory ID#: VA00010

The release of this report is authorized by:

R. J. Porter
Technical Director

Flow if Avaliable (GPM): 3699.0
Temp. if Available (C): 15.5
Depth if Available (Ft):
Analysis Package Code: EPA0902R

PSCN
Rev-7-24-12

Type of Sample: Grab
BDL = Below Detection Limit
FLD = Field Technician
MR = Multiple analytical runs were used for this result
IV = Flag indicates Insufficient Sample Volume

J = Flag indicates estimated value below Report Limit
T = Results indicate possible toxicity which is expected to influence reported value.
NA = A result for this analyte is not available.
MI = Matrix Interference - Final result may not be representative.
BQ = Batch QC Outside Acceptable Range
HE = Parameter Hold Time Exceeded
FC = Failure to Comply Current SOP
R = Sample results rejected because of gross deficiencies in QC or method performance .

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Certificate of Analysis

Client Name: RED RIVER COAL COMPANY
Address: P.O. BOX 668
NORTON, VA 24273

Report Date: 06/03/13
Lab Sample No.: **1325822**
Client No.: 95
EMI Project No.: 97

Sample Identification: 1199.01 - BRFK2

Site Description: 1101760

Date Collected: 05/16/13
Time Collected: 1030
Sample Matrix: AQ
Collected By: J BREEDING

Parameter	Sample Result	Units	MDL	RL	Method	Date Analyzed	Time Analyzed	Analyst
Aluminum, Total	0.115	mg/l	0.024	0.050	200.7	5/21/2013	11	AWM
Antimony, Total	0.114 J	ug/l	0.113	2.00	200.8	5/21/2013	1237	CLS
Arsenic, Total	0.256 J	ug/l	0.154	2.00	200.8	5/21/2013	1237	CLS
Barium, Total	31.6	ug/l	0.171	2.00	200.8	5/21/2013	1237	CLS
Beryllium, Total	BDL	ug/l	0.078	2.00	200.8	5/21/2013	1237	CLS
Boron, Total	0.016 J	mg/l	0.0054	0.030	200.7	5/22/2013	1326	AWM
Cadmium, Total	BDL	ug/l	0.154	2.00	200.8	5/21/2013	1237	CLS
Chromium, Total	0.142 J	ug/l	0.098	2.00	200.8	5/21/2013	1237	CLS
Cobalt, Total	0.343 J	ug/l	0.143	2.00	200.8	5/21/2013	1237	CLS
Copper, Total	0.527 J	ug/l	0.080	2.00	200.8	5/21/2013	1237	CLS
Iron, Total	0.310	mg/l	0.016	0.050	200.7	5/21/2013	11	AWM
Lead, Total	0.180 J	ug/l	0.054	2.00	200.8	5/21/2013	1237	CLS
Magnesium, Total	56.6	mg/l	0.032	0.500	EPA 200.7	5/22/2013	950	AWM
Manganese, Total	0.085	mg/l	0.011	0.050	200.7	5/21/2013	11	AWM
Mercury, Total	BDL	ug/l	0.161	0.500	EPA 245.1-REV.3	5/21/2013	1409	SAS
Nickel, Total	1.10 J	ug/l	0.169	2.00	200.8	5/21/2013	1237	CLS
Selenium, Total	2.30	ug/l	0.731	2.00	200.8	5/21/2013	1237	CLS

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Certificate of Analysis

Client Name: RED RIVER COAL COMPANY
Address: P.O. BOX 668
NORTON, VA 24273

Report Date: 06/03/13
Lab Sample No.: **1325822**
Client No.: 95
EMI Project No.: 97

Sample Identification: 1199.01 - BRFK2
Site Description: 1101760

Date Collected: 05/16/13
Time Collected: 1030
Sample Matrix: AQ
Collected By: J BREEDING

Parameter	Sample Result	Units	MDL	RL	Method	Date Analyzed	Time Analyzed	Analyst
Silver, Total	BDL	ug/l	0.101	2.00	200.8	5/21/2013	1237	CLS
Thallium, Total	BDL	ug/l	0.076	2.00	200.8	5/21/2013	1237	CLS
Zinc, Total	3.00 J	ug/l	0.328	10.0	200.8	5/21/2013	1237	CLS

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Certificate of Analysis

Client Name: RED RIVER COAL COMPANY
Address: P.O. BOX 668
NORTON, VA 24273

Report Date: 06/03/13
Lab Sample No.: **1325823**
Client No.: 95
EMI Project No.: 97

Sample Identification: 1199.01 - BRFK1

Site Description: 1101760

Date Collected: 05/16/13
Time Collected: 1110
Sample Matrix: AQ
Collected By: J BREEDING

Parameter		Sample Result	Units	MDL	RL	Method	Date Analyzed	Time Analyzed	Analyst
Acidity, Hot		BDL	mg/l CaCO3	1.00	1.00	SM 2310B-2011	5/28/2013	1336	MCF
Alkalinity		232	mg/l CaCO3	1.00	1.00	SM 2320B-2011	5/28/2013	939	MCF
Alkalinity, CO3	Not NELAP	2.16	mg/l	0.100		4500-CO2-D	5/29/2013	1142	JLW
Alkalinity, HC03	Not NELAP	230	mg/l	0.100		4500-CO2-D	5/29/2013	1142	JLW
Bromide		0.070 J	mg/l	0.020	0.200	EPA 300.0	5/17/2013	1548	JLW
Chloride		4.48	mg/l	0.011	0.100	EPA 300.0	5/24/2013	1453	KMC
Conductivity		1341	umhos/cm	1.00	1.00	SM 2510B-2011	5/17/2013	1958	JRS
Flow, Measured	Not NELAP	3653	gpm				5/16/2013	1110	FLD
Hardness, Total		496	mg/l CaCO3	4.00	4.00	SM 2340 C-2011	5/21/2013	1335	SET
Nitrate		0.420	mg/l	0.012	0.200	EPA 300.0	5/17/2013	1548	JLW
Nitrite		0.090 J	mg/l	0.016	0.200	EPA 300.0	5/17/2013	1548	JLW
pH	Not NELAP	8.01	STD			SM 4500-H+B-201	5/16/2013	1110	FLD
Sulfate		368	mg/l	1.03	5.00	EPA 300.0	5/29/2013	1640	KMC
Total Dissolved Solids		968	mg/l	50.0	50.0	SM 2540C-2011	5/17/2013	1342	THR
Total Suspended Solids		6.00	mg/l	2.50	2.50	SM 2540 D-2011	5/16/2013	2310	MLS

To the best of our knowledge and belief, the collection, preservation, and analysis of all parameters represented by this report have been determined to comply the requirements as specified in 40 CFR, Part 136.
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VA Laboratory ID#: 460038
WV Laboratory ID#: 105
EPA Laboratory ID#: VA00010

The release of this report is authorized by:

R. J. Porter
Technical Director

Flow if Avaliable (GPM): 3653.0
Temp. if Available (C): 14.7
Depth if Available (Ft):
Analysis Package Code: EPA0902R

PSCN
Rev-7-24-12

Type of Sample: Grab
BDL = Below Detection Limit
FLD = Field Technician
MR = Multiple analytical runs were used for this result
IV = Flag indicates Insufficient Sample Volume

J = Flag indicates estimated value below Report Limit
T = Results indicate possible toxicity which is expected to influence reported value.
NA = A result for this analyte is not available.
MI = Matrix Interference - Final result may not be representative.
BQ = Batch QC Outside Acceptable Range
HE = Parameter Hold Time Exceeded
FC = Failure to Comply Current SOP
R = Sample results rejected because of gross deficiencies in QC or method performance .

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Certificate of Analysis

Client Name: RED RIVER COAL COMPANY
Address: P.O. BOX 668
NORTON, VA 24273

Report Date: 06/03/13
Lab Sample No.: **1325823**
Client No.: 95
EMI Project No.: 97

Sample Identification: 1199.01 - BRFK1
Site Description: 1101760

Date Collected: 05/16/13
Time Collected: 1110
Sample Matrix: AQ
Collected By: J BREEDING

Parameter	Sample Result	Units	MDL	RL	Method	Date Analyzed	Time Analyzed	Analyst
Aluminum, Total	0.060	mg/l	0.024	0.050	200.7	5/21/2013	12	AWM
Antimony, Total	BDL	ug/l	0.113	2.00	200.8	5/21/2013	1302	CLS
Arsenic, Total	0.233 J	ug/l	0.154	2.00	200.8	5/21/2013	1302	CLS
Barium, Total	31.1	ug/l	0.171	2.00	200.8	5/21/2013	1302	CLS
Beryllium, Total	BDL	ug/l	0.078	2.00	200.8	5/21/2013	1302	CLS
Boron, Total	0.016 J	mg/l	0.0054	0.030	200.7	5/22/2013	1329	AWM
Cadmium, Total	BDL	ug/l	0.154	2.00	200.8	5/21/2013	1302	CLS
Chromium, Total	0.221 J	ug/l	0.098	2.00	200.8	5/21/2013	1302	CLS
Cobalt, Total	0.281 J	ug/l	0.143	2.00	200.8	5/21/2013	1302	CLS
Copper, Total	0.428 J	ug/l	0.080	2.00	200.8	5/21/2013	1302	CLS
Iron, Total	0.285	mg/l	0.016	0.050	200.7	5/21/2013	12	AWM
Lead, Total	0.090 J	ug/l	0.054	2.00	200.8	5/21/2013	1302	CLS
Magnesium, Total	49.8	mg/l	0.032	0.500	EPA 200.7	5/22/2013	955	AWM
Manganese, Total	0.102	mg/l	0.011	0.050	200.7	5/21/2013	12	AWM
Mercury, Total	BDL	ug/l	0.161	0.500	EPA 245.1-REV.3	5/21/2013	1409	SAS
Nickel, Total	0.845 J	ug/l	0.169	2.00	200.8	5/21/2013	1302	CLS
Selenium, Total	1.68 J	ug/l	0.731	2.00	200.8	5/21/2013	1302	CLS

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Certificate of Analysis

Client Name: RED RIVER COAL COMPANY
Address: P.O. BOX 668
NORTON, VA 24273

Report Date: 06/03/13
Lab Sample No.: **1325823**
Client No.: 95
EMI Project No.: 97

Sample Identification: 1199.01 - BRFK1

Site Description: 1101760

Date Collected: 05/16/13
Time Collected: 1110
Sample Matrix: AQ
Collected By: J BREEDING

Parameter	Sample Result	Units	MDL	RL	Method	Date Analyzed	Time Analyzed	Analyst
Silver, Total	BDL	ug/l	0.101	2.00	200.8	5/21/2013	1302	CLS
Thallium, Total	BDL	ug/l	0.076	2.00	200.8	5/21/2013	1302	CLS
Zinc, Total	1.12 J	ug/l	0.328	10.0	200.8	5/21/2013	1302	CLS

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Certificate of Analysis

Client Name: RED RIVER COAL COMPANY
Address: P.O. BOX 668
NORTON, VA 24273

Report Date: 06/03/13
Lab Sample No.: **1325824**
Client No.: 95
EMI Project No.: 97

Sample Identification: 1199.01 - BPR1
Site Description: 1101760

Date Collected: 05/16/13
Time Collected: 1215
Sample Matrix: AQ
Collected By: J BREEDING

Parameter		Sample Result	Units	MDL	RL	Method	Date Analyzed	Time Analyzed	Analyst
Acidity, Hot		BDL	mg/l CaCO3	1.00	1.00	SM 2310B-2011	5/28/2013	1336	MCF
Alkalinity		117	mg/l CaCO3	1.00	1.00	SM 2320B-2011	5/28/2013	1052	MCF
Alkalinity, CO3	Not NELAP	1.37	mg/l	0.100		4500-CO2-D	5/29/2013	1142	JLW
Alkalinity, HC03	Not NELAP	116	mg/l	0.100		4500-CO2-D	5/29/2013	1142	JLW
Bromide		BDL	mg/l	0.020	0.200	EPA 300.0	5/17/2013	1604	JLW
Chloride		4.38	mg/l	0.011	0.100	EPA 300.0	5/24/2013	1503	KMC
Conductivity		1036	umhos/cm	1.00	1.00	SM 2510B-2011	5/17/2013	1958	JRS
Flow, Measured	Not NELAP	306	gpm				5/16/2013	1215	FLD
Hardness, Total		528	mg/l CaCO3	4.00	4.00	SM 2340 C-2011	5/21/2013	1335	SET
Nitrate		0.530	mg/l	0.012	0.200	EPA 300.0	5/17/2013	1604	JLW
Nitrite		0.090 J	mg/l	0.016	0.200	EPA 300.0	5/17/2013	1604	JLW
pH	Not NELAP	8.09	STD			SM 4500-H+B-201	5/16/2013	1215	FLD
Sulfate		396	mg/l	1.03	5.00	EPA 300.0	5/29/2013	1650	KMC
Total Dissolved Solids		822	mg/l	50.0	50.0	SM 2540C-2011	5/17/2013	1440	THR
Total Suspended Solids		5.00	mg/l	2.50	2.50	SM 2540 D-2011	5/16/2013	2313	MLS

To the best of our knowledge and belief, the collection, preservation, and analysis of all parameters represented by this report have been determined to comply the requirements as specified in 40 CFR, Part 136.
This report may not be reproduced except in full, without the written approval of the laboratory.

VA Laboratory ID#: 460038
WV Laboratory ID#: 105
EPA Laboratory ID#: VA00010

The release of this report is authorized by:

R. J. Porter
Technical Director

Flow if Avaliable (GPM): 306.0
Temp. if Available (C): 13.7
Depth if Available (Ft):
Analysis Package Code: EPA0902R

PSCN
Rev-7-24-12

Type of Sample: Grab
BDL = Below Detection Limit
FLD = Field Technician
MR = Multiple analytical runs were used for this result
IV = Flag indicates Insufficient Sample Volume

J = Flag indicates estimated value below Report Limit
T = Results indicate possible toxicity which is expected to influence reported value.
NA = A result for this analyte is not available.
MI = Matrix Interference - Final result may not be representative.
BQ = Batch QC Outside Acceptable Range
HE = Parameter Hold Time Exceeded
FC = Failure to Comply Current SOP
R = Sample results rejected because of gross deficiencies in QC or method performance .

ENVIRONMENTAL MONITORING, INCORPORATED
ENVIRONMENTAL CONSULTANTS ▲ ANALYTICAL LABORATORIES
P.O. BOX 1190 ▲ NORTON, VIRGINIA 24273 ▲ 276/679-6544

Certificate of Analysis

Client Name: RED RIVER COAL COMPANY
Address: P.O. BOX 668
NORTON, VA 24273

Report Date: 06/03/13
Lab Sample No.: **1325824**
Client No.: 95
EMI Project No.: 97

Sample Identification: 1199.01 - BPR1

Site Description: 1101760

Date Collected: 05/16/13
Time Collected: 1215
Sample Matrix: AQ
Collected By: J BREEDING

Parameter	Sample Result	Units	MDL	RL	Method	Date Analyzed	Time Analyzed	Analyst
Aluminum, Total	0.083	mg/l	0.024	0.050	200.7	5/21/2013	14	AWM
Antimony, Total	BDL	ug/l	0.113	2.00	200.8	5/21/2013	1247	CLS
Arsenic, Total	0.214 J	ug/l	0.154	2.00	200.8	5/21/2013	1247	CLS
Barium, Total	71.2	ug/l	0.171	2.00	200.8	5/21/2013	1247	CLS
Beryllium, Total	BDL	ug/l	0.078	2.00	200.8	5/21/2013	1247	CLS
Boron, Total	0.0096 J	mg/l	0.0054	0.030	200.7	5/22/2013	1333	AWM
Cadmium, Total	BDL	ug/l	0.154	2.00	200.8	5/21/2013	1247	CLS
Chromium, Total	0.142 J	ug/l	0.098	2.00	200.8	5/21/2013	1247	CLS
Cobalt, Total	0.225 J	ug/l	0.143	2.00	200.8	5/21/2013	1247	CLS
Copper, Total	0.415 J	ug/l	0.080	2.00	200.8	5/21/2013	1247	CLS
Iron, Total	0.178	mg/l	0.016	0.050	200.7	5/21/2013	14	AWM
Lead, Total	0.130 J	ug/l	0.054	2.00	200.8	5/21/2013	1247	CLS
Magnesium, Total	56.4	mg/l	0.032	0.500	EPA 200.7	5/22/2013	1001	AWM
Manganese, Total	0.017 J	mg/l	0.011	0.050	200.7	5/21/2013	14	AWM
Mercury, Total	BDL	ug/l	0.161	0.500	EPA 245.1-REV.3	5/21/2013	1409	SAS
Nickel, Total	0.560 J	ug/l	0.169	2.00	200.8	5/21/2013	1247	CLS
Selenium, Total	1.74 J	ug/l	0.731	2.00	200.8	5/21/2013	1247	CLS

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P.O. BOX 1190 ▲ NORTON, VIRGINIA 24273 ▲ 276/679-6544

Certificate of Analysis

Client Name: RED RIVER COAL COMPANY
Address: P.O. BOX 668
NORTON, VA 24273

Report Date: 06/03/13
Lab Sample No.: **1325824**
Client No.: 95
EMI Project No.: 97

Sample Identification: 1199.01 - BPR1
Site Description: 1101760

Date Collected: 05/16/13
Time Collected: 1215
Sample Matrix: AQ
Collected By: J BREEDING

Parameter	Sample Result	Units	MDL	RL	Method	Date Analyzed	Time Analyzed	Analyst
Silver, Total	BDL	ug/l	0.101	2.00	200.8	5/21/2013	1247	CLS
Thallium, Total	BDL	ug/l	0.076	2.00	200.8	5/21/2013	1247	CLS
Zinc, Total	1.42 J	ug/l	0.328	10.0	200.8	5/21/2013	1247	CLS

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Savannah
5102 LaRoche Avenue
Savannah, GA 31404
Tel: (912)354-7858

TestAmerica Job ID: 680-90531-5
Client Project/Site: 95.97

For:
Environmental Monitoring, Inc.
5730 Industrial Park Rd.
Norton, Virginia 24273

Attn: Donna Phillips

Authorized for release by:
6/4/2013 3:31:56 PM

Sheila Hoffman, Project Manager I
sheila.hoffman@testamericainc.com

Sample Summary

Client: Environmental Monitoring, Inc.
Project/Site: 95.97

TestAmerica Job ID: 680-90531-5

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
680-90531-15	1325819	Water	05/16/13 08:25	05/21/13 10:15
680-90531-16	1325820	Water	05/16/13 09:15	05/21/13 10:15
680-90531-17	1325821	Water	05/16/13 10:00	05/21/13 10:15
680-90531-18	1325822	Water	05/16/13 10:30	05/21/13 10:15
680-90531-19	1325823	Water	05/16/13 11:10	05/21/13 10:15
680-90531-20	1325824	Water	05/16/13 12:15	05/21/13 10:15

Method Summary

Client: Environmental Monitoring, Inc.
Project/Site: 95.97

TestAmerica Job ID: 680-90531-5

Method	Method Description	Protocol	Laboratory
335.4	Cyanide, Total	MCAWW	TAL SAV
420.1	Phenolics, Total Recoverable	MCAWW	TAL SAV
SM 5310B	Organic Carbon, Dissolved (DOC)	SM	TAL SAV

Protocol References:

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

SM = "Standard Methods For The Examination Of Water And Wastewater",

Laboratory References:

TAL SAV = TestAmerica Savannah, 5102 LaRoche Avenue, Savannah, GA 31404, TEL (912)354-7858

Definitions/Glossary

Client: Environmental Monitoring, Inc.
Project/Site: 95.97

TestAmerica Job ID: 680-90531-5

Qualifiers

General Chemistry

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client: Environmental Monitoring, Inc.
Project/Site: 95.97

TestAmerica Job ID: 680-90531-5

Client Sample ID: 1325819 -1199.01 - BCPT1

Lab Sample ID: 680-90531-15
Date Collected: 05/16/13 08:25
Matrix: Water
Date Received: 05/21/13 10:15

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Total	0.0025	U	0.010	0.0025	mg/L		05/28/13 10:00	05/28/13 14:39	1
Phenolics, Total Recoverable	0.025	U	0.050	0.025	mg/L		06/03/13 08:32	06/03/13 12:16	1

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dissolved Organic Carbon	1.3		1.0	0.50	mg/L			06/02/13 21:33	1

Client Sample ID: 1325820 -1199.01 - BRFK4

Lab Sample ID: 680-90531-16
Date Collected: 05/16/13 09:15
Matrix: Water
Date Received: 05/21/13 10:15

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Total	0.0025	U	0.010	0.0025	mg/L		05/28/13 10:00	05/28/13 14:40	1
Phenolics, Total Recoverable	0.025	U	0.050	0.025	mg/L		06/03/13 08:32	06/03/13 12:16	1

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dissolved Organic Carbon	0.97	J	1.0	0.50	mg/L			06/02/13 21:47	1

Client Sample ID: 1325821 -1199.01 - BRFK3

Lab Sample ID: 680-90531-17
Date Collected: 05/16/13 10:00
Matrix: Water
Date Received: 05/21/13 10:15

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Total	0.0025	U	0.010	0.0025	mg/L		05/28/13 10:00	05/28/13 14:41	1
Phenolics, Total Recoverable	0.025	U	0.050	0.025	mg/L		06/03/13 08:32	06/03/13 12:16	1

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dissolved Organic Carbon	1.0		1.0	0.50	mg/L			06/02/13 22:02	1

Client Sample ID: 1325822 -1199.01 - BRFK2

Lab Sample ID: 680-90531-18
Date Collected: 05/16/13 10:30
Matrix: Water
Date Received: 05/21/13 10:15

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Total	0.0025	U	0.010	0.0025	mg/L		05/28/13 10:00	05/28/13 14:42	1
Phenolics, Total Recoverable	0.025	U	0.050	0.025	mg/L		06/03/13 08:32	06/03/13 12:16	1

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dissolved Organic Carbon	1.1		1.0	0.50	mg/L			06/02/13 22:16	1

Client: Environmental Monitoring, Inc.
Project/Site: 95.97

TestAmerica Job ID: 680-90531-5

Client Sample ID: 1325823 -1199.01 - BRFK1
Lab Sample ID: 680-90531-19
Date Collected: 05/16/13 11:10
Matrix: Water
Date Received: 05/21/13 10:15

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Total	0.0025	U	0.010	0.0025	mg/L		05/28/13 10:00	05/28/13 14:43	1
Phenolics, Total Recoverable	0.025	U	0.050	0.025	mg/L		06/03/13 08:32	06/03/13 12:16	1

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dissolved Organic Carbon	0.86	J	1.0	0.50	mg/L			06/02/13 22:31	1

Client Sample ID: 1325824 -1199.01 - BPR1
Lab Sample ID: 680-90531-20
Date Collected: 05/16/13 12:15
Matrix: Water
Date Received: 05/21/13 10:15

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Total	0.0025	U	0.010	0.0025	mg/L		05/28/13 10:00	05/28/13 14:45	1
Phenolics, Total Recoverable	0.031	J	0.050	0.025	mg/L		06/03/13 08:32	06/03/13 12:16	1

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dissolved Organic Carbon	1.0		1.0	0.50	mg/L			06/02/13 22:45	1

Client: Environmental Monitoring, Inc.
Project/Site: 95.97

TestAmerica Job ID: 680-90531-5

Method: 335.4 - Cyanide, Total

Lab Sample ID: MB 680-278137/1-A
Matrix: Water
Analysis Batch: 278209

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 278137

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Total	0.0025	U	0.010	0.0025	mg/L		05/28/13 10:00	05/28/13 14:15	1

Lab Sample ID: LCS 680-278137/2-A
Matrix: Water
Analysis Batch: 278209

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 278137

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Cyanide, Total	0.0500	0.0510		mg/L		102	90 - 110

Method: 420.1 - Phenolics, Total Recoverable

Lab Sample ID: MB 680-278826/1-A
Matrix: Water
Analysis Batch: 278887

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 278826

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Phenolics, Total Recoverable	0.025	U	0.050	0.025	mg/L		06/03/13 08:32	06/03/13 12:16	1

Lab Sample ID: LCS 680-278826/2-A
Matrix: Water
Analysis Batch: 278887

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 278826

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Phenolics, Total Recoverable	0.248	0.192		mg/L		77	75 - 125

Method: SM 5310B - Organic Carbon, Dissolved (DOC)

Lab Sample ID: MB 680-278934/4
Matrix: Water
Analysis Batch: 278934

Client Sample ID: Method Blank
Prep Type: Dissolved

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dissolved Organic Carbon	0.50	U	1.0	0.50	mg/L			06/02/13 15:59	1

Lab Sample ID: LCS 680-278934/5
Matrix: Water
Analysis Batch: 278934

Client Sample ID: Lab Control Sample
Prep Type: Dissolved

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Dissolved Organic Carbon	20.0	18.9		mg/L		94	80 - 120
DOC Result 3	20.0	18.9		mg/L		94	80 - 120
DOC Result 2	20.0	18.9		mg/L		94	80 - 120
DOC Result 1	20.0	18.9		mg/L		95	80 - 120

General Chemistry

Prep Batch: 278137

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-90531-15	1325819	Total/NA	Water	Distill/CN	
680-90531-16	1325820	Total/NA	Water	Distill/CN	
680-90531-17	1325821	Total/NA	Water	Distill/CN	
680-90531-18	1325822	Total/NA	Water	Distill/CN	
680-90531-19	1325823	Total/NA	Water	Distill/CN	
680-90531-20	1325824	Total/NA	Water	Distill/CN	
LCS 680-278137/2-A	Lab Control Sample	Total/NA	Water	Distill/CN	
MB 680-278137/1-A	Method Blank	Total/NA	Water	Distill/CN	

Analysis Batch: 278209

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-90531-15	1325819	Total/NA	Water	335.4	278137
680-90531-16	1325820	Total/NA	Water	335.4	278137
680-90531-17	1325821	Total/NA	Water	335.4	278137
680-90531-18	1325822	Total/NA	Water	335.4	278137
680-90531-19	1325823	Total/NA	Water	335.4	278137
680-90531-20	1325824	Total/NA	Water	335.4	278137
LCS 680-278137/2-A	Lab Control Sample	Total/NA	Water	335.4	278137
MB 680-278137/1-A	Method Blank	Total/NA	Water	335.4	278137

Prep Batch: 278826

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-90531-15	1325819	Total/NA	Water	Distill/Phenol	
680-90531-16	1325820	Total/NA	Water	Distill/Phenol	
680-90531-17	1325821	Total/NA	Water	Distill/Phenol	
680-90531-18	1325822	Total/NA	Water	Distill/Phenol	
680-90531-19	1325823	Total/NA	Water	Distill/Phenol	
680-90531-20	1325824	Total/NA	Water	Distill/Phenol	
LCS 680-278826/2-A	Lab Control Sample	Total/NA	Water	Distill/Phenol	
MB 680-278826/1-A	Method Blank	Total/NA	Water	Distill/Phenol	

Analysis Batch: 278887

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-90531-15	1325819	Total/NA	Water	420.1	278826
680-90531-16	1325820	Total/NA	Water	420.1	278826
680-90531-17	1325821	Total/NA	Water	420.1	278826
680-90531-18	1325822	Total/NA	Water	420.1	278826
680-90531-19	1325823	Total/NA	Water	420.1	278826
680-90531-20	1325824	Total/NA	Water	420.1	278826
LCS 680-278826/2-A	Lab Control Sample	Total/NA	Water	420.1	278826
MB 680-278826/1-A	Method Blank	Total/NA	Water	420.1	278826

Analysis Batch: 278934

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-90531-15	1325819	Dissolved	Water	SM 5310B	
680-90531-16	1325820	Dissolved	Water	SM 5310B	
680-90531-17	1325821	Dissolved	Water	SM 5310B	
680-90531-18	1325822	Dissolved	Water	SM 5310B	
680-90531-19	1325823	Dissolved	Water	SM 5310B	
680-90531-20	1325824	Dissolved	Water	SM 5310B	
LCS 680-278934/5	Lab Control Sample	Dissolved	Water	SM 5310B	

Client: Environmental Monitoring, Inc.
Project/Site: 95.97

TestAmerica Job ID: 680-90531-5

General Chemistry (Continued)

Analysis Batch: 278934 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 680-278934/4	Method Blank	Dissolved	Water	SM 5310B	

Client Sample ID: 1325819

Lab Sample ID: 680-90531-15

Date Collected: 05/16/13 08:25

Matrix: Water

Date Received: 05/21/13 10:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Distill/CN			278137	05/28/13 10:00	DAM	TAL SAV
Total/NA	Analysis	335.4		1	278209	05/28/13 14:39	DAM	TAL SAV
Total/NA	Prep	Distill/Phenol			278826	06/03/13 08:32	TF	TAL SAV
Total/NA	Analysis	420.1		1	278887	06/03/13 12:16	TF	TAL SAV
Dissolved	Analysis	SM 5310B		1	278934	06/02/13 21:33	JR	TAL SAV

Client Sample ID: 1325820

Lab Sample ID: 680-90531-16

Date Collected: 05/16/13 09:15

Matrix: Water

Date Received: 05/21/13 10:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Distill/CN			278137	05/28/13 10:00	DAM	TAL SAV
Total/NA	Analysis	335.4		1	278209	05/28/13 14:40	DAM	TAL SAV
Total/NA	Prep	Distill/Phenol			278826	06/03/13 08:32	TF	TAL SAV
Total/NA	Analysis	420.1		1	278887	06/03/13 12:16	TF	TAL SAV
Dissolved	Analysis	SM 5310B		1	278934	06/02/13 21:47	JR	TAL SAV

Client Sample ID: 1325821

Lab Sample ID: 680-90531-17

Date Collected: 05/16/13 10:00

Matrix: Water

Date Received: 05/21/13 10:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Distill/CN			278137	05/28/13 10:00	DAM	TAL SAV
Total/NA	Analysis	335.4		1	278209	05/28/13 14:41	DAM	TAL SAV
Total/NA	Prep	Distill/Phenol			278826	06/03/13 08:32	TF	TAL SAV
Total/NA	Analysis	420.1		1	278887	06/03/13 12:16	TF	TAL SAV
Dissolved	Analysis	SM 5310B		1	278934	06/02/13 22:02	JR	TAL SAV

Client Sample ID: 1325822

Lab Sample ID: 680-90531-18

Date Collected: 05/16/13 10:30

Matrix: Water

Date Received: 05/21/13 10:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Distill/CN			278137	05/28/13 10:00	DAM	TAL SAV
Total/NA	Analysis	335.4		1	278209	05/28/13 14:42	DAM	TAL SAV
Total/NA	Prep	Distill/Phenol			278826	06/03/13 08:32	TF	TAL SAV
Total/NA	Analysis	420.1		1	278887	06/03/13 12:16	TF	TAL SAV
Dissolved	Analysis	SM 5310B		1	278934	06/02/13 22:16	JR	TAL SAV

Lab Chronicle

Client: Environmental Monitoring, Inc.
Project/Site: 95.97

TestAmerica Job ID: 680-90531-5

Client Sample ID: 1325823

Lab Sample ID: 680-90531-19

Date Collected: 05/16/13 11:10

Matrix: Water

Date Received: 05/21/13 10:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Distill/CN			278137	05/28/13 10:00	DAM	TAL SAV
Total/NA	Analysis	335.4		1	278209	05/28/13 14:43	DAM	TAL SAV
Total/NA	Prep	Distill/Phenol			278826	06/03/13 08:32	TF	TAL SAV
Total/NA	Analysis	420.1		1	278887	06/03/13 12:16	TF	TAL SAV
Dissolved	Analysis	SM 5310B		1	278934	06/02/13 22:31	JR	TAL SAV

Client Sample ID: 1325824

Lab Sample ID: 680-90531-20

Date Collected: 05/16/13 12:15

Matrix: Water

Date Received: 05/21/13 10:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Distill/CN			278137	05/28/13 10:00	DAM	TAL SAV
Total/NA	Analysis	335.4		1	278209	05/28/13 14:45	DAM	TAL SAV
Total/NA	Prep	Distill/Phenol			278826	06/03/13 08:32	TF	TAL SAV
Total/NA	Analysis	420.1		1	278887	06/03/13 12:16	TF	TAL SAV
Dissolved	Analysis	SM 5310B		1	278934	06/02/13 22:45	JR	TAL SAV

Laboratory References:

TAL SAV = TestAmerica Savannah, 5102 LaRoche Avenue, Savannah, GA 31404, TEL (912)354-7858

Log Sheet 1 of 1

C012963

SAMPLE LOG SHEET & CHAIN OF CUSTODY

EMI PROFESSIONAL SERVICES

ENVIRONMENTAL MONITORING, INCORPORATED
ENVIRONMENTAL CONSULTANTS ▲ ANALYTICAL LABORATORIES
P.O. Box 1190 ▲ Norton, Virginia 24273 ▲ 276-679-6544

CUSTOMER INFORMATION: Shaded Areas • LAB INFORMATION: White Areas

*CLIENT: Red River Coal Company, Inc. BILLING ADDRESS:
*CONTACT: CITY:
STATE/ZIP
PHONE ( )
FAX ( )
Purchase Order No.

*COLLECTED BY (print): James Breeding & Joe Day
COLLECTOR(S) SIGNATURE(S): [signature]
TURN-AROUND (circle): 2 Day (Working Days) 3 Day (Working Days) 5 Day (Working Days) 10 Day (Working Days) (Regular) (15 Working Days)

Additional Cost May Apply – Any TAT Not Specified Will Be Regular

*SITE ID: 1101760
CLIENT PROJ. NO. 1199.01
*EMI PROJECT NO.: 95.97
EMI PROJECT MANAGER: RJP
Special Instructions / QC Requirements & Comments: EPA Sampling

SAMPLES WILL BE DISPOSED OF IN ACCORDANCE WITH EMI's TERMS & CONDITIONS OR RETURNED TO CLIENT OR Archive for ______ months

*PARAMETER (ANALYSIS REQUESTED) / *PRESERVATIVE USED:

	EMI No.	EMI SAMPLE #	*CUSTOMER SAMPLE IDENTIFICATION	*DATE COLLECTED	*TIME COLLECTED	*SAMPLE MATRIX	*No. of CNTRS.	Misc. See List / Cool < 6°C	Total Metal Hardness / HNO_3	Dissolved Organic Carbon / HCl	Phenols / H_2SO_4	Cyanide / Na OH	Other		pH	Temp °C	CFS	Preservation Checked By Date: 5/16/13 [initials]	REMARKS Flow GPM
1.		325819	1199.01-BCPT1	5-16-13	8:25	AQ	7	x	x	x	x	x 7/12			8.05	12.16	4.857	<2	2173
2.		820	1199.01-BRFK4	5-16-13	9:15	AQ	7	x	x	x	x	x 7/12			8.29	14.7	19.108	<2	8560
3.		821	1199.01-BRFK3	5-16-13	10:00	AQ	7	x	x	x	x	x 7/12			8.32	15.2	10.21	<2	4574
4.		822	1199.01-BRFK2	5-16-13	10:30	AQ	7	x	x	x	x	x 7/12			8.27	15.5	8.256	<2	3699
5.		823	1199.01-BRFK1	5-16-13	11:10	AQ	7	x	x	x	x	x 7/12			8.01	14.7	8.159	<2	3653
6.		824	1199.01-BPR1	5-16-13	12:15	AQ	7	x	x	x	x	x 7/12			8.09	13.7	0.684	<2	306
7.																			
8.																			
9.																			
10.																			

Check Shaded Area for Each Parameter
Required on Each Sample
White Area Lab Use Only

All samples requiring pH preservation were verified to be as indicated on COC by: [initials] Date: 5/16/13 Time: 2255

QA Review:

Anomaly Report Required:

Hazard Information: (circle) Non Hazard Flammable Skin Irritant Poison B Unknown

*Relinquished by (sign)	*Date/Time	*Received By (sign)	*Relinquished by (sign)	*Date/Time	*Received By (sign)
[signature]	5/16/13 1610	Anna Phillips	Anna Phillips	5/16/13 1635	[signature] Lab Cooler
			Cooler	5/16/13 2255	[signature]

*METHOD OF SHIPMENT TO LAB (circle): US MAIL UPS FED. EX. EMI-DIRECT EMI PICKUP (PERSONAL DELIVERY) OTHER

Temperature of Cooler upon Receipt by Lab 0°C

PH Meter # ______ BIN # 06 No. of Containers 42 [signature]

Report to be sent (if different than customer information):
NAME: Travis Lowe
ADDRESS: tlowe@atsone.com
CITY:
STATE/ZIP FAX ( )

Login Sample Receipt Checklist

Client: Environmental Monitoring, Inc.

Job Number: 680-90531-5

Login Number: 90531

List Number: 1

Creator: Conner, Keaton

List Source: TestAmerica Savannah

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Certification Summary

Client: Environmental Monitoring, Inc.
Project/Site: 95.97

TestAmerica Job ID: 680-90531-5

Laboratory: TestAmerica Savannah

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
A2LA	DoD ELAP		399.01	07-31-13
Alabama	State Program	4	41450	06-30-13
Alaska (UST)	State Program	10	UST-104	06-19-13
Arkansas DEQ	State Program	6	88-0692	02-01-13 *
California	NELAP	9	3217CA	07-31-13
Colorado	State Program	8	N/A	12-31-13
Florida	NELAP	4	E87052	06-30-13
GA Dept. of Agriculture	State Program	4	N/A	12-31-13
Georgia	State Program	4	N/A	06-30-13
Georgia	State Program	4	803	06-30-13
Hawaii	State Program	9	N/A	06-30-13
Illinois	NELAP	5	200022	11-30-13
Indiana	State Program	5	N/A	06-30-13
Iowa	State Program	7	353	07-01-13 *
Kentucky	State Program	4	90084	12-31-12 *
Kentucky (UST)	State Program	4	18	03-31-13 *
Louisiana	NELAP	6	30690	06-30-13
Louisiana	NELAP	6	LA100015	12-31-13
Maine	State Program	1	GA00006	08-16-14
Maryland	State Program	3	250	12-31-13
Massachusetts	State Program	1	M-GA006	06-30-13
Michigan	State Program	5	9925	06-30-13
Mississippi	State Program	4	N/A	06-30-13
Montana	State Program	8	CERT0081	01-01-14
Nebraska	State Program	7	TestAmerica-Savannah	06-30-13 *
New Jersey	NELAP	2	GA769	06-30-13
New Mexico	State Program	6	N/A	06-30-13
New York	NELAP	2	10842	04-01-14
North Carolina DENR	State Program	4	269	12-31-13
North Carolina DHHS	State Program	4	13701	07-31-13
Oklahoma	State Program	6	9984	08-31-13
Pennsylvania	NELAP	3	68-00474	06-30-13 *
Puerto Rico	State Program	2	GA00006	01-01-14
South Carolina	State Program	4	98001	06-30-13
Tennessee	State Program	4	TN02961	06-30-13
Texas	NELAP	6	T104704185-08-TX	11-30-13
USDA	Federal		SAV 3-04	04-07-14
Virginia	NELAP	3	460161	06-14-13 *
Washington	State Program	10	C1794	06-10-13
West Virginia	State Program	3	9950C	12-31-13
West Virginia DEP	State Program	3	94	06-30-13
Wisconsin	State Program	5	999819810	08-31-13
Wyoming	State Program	8	8TMS-Q	06-30-13

* Expired certification is currently pending renewal and is considered valid.